

Report of the
**Expert Consultation
on
Floriculture Development
in Asia**

Kunming, China
7-9 January, 2010



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REPORT OF THE

EXPERT CONSULTATION ON

FLORICULTURE DEVELOPMENT IN ASIA

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7 – 9 JANUARY 2010

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FOOD AND AGRICULTURE ORGANIZATION OF THE
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Foreword

FAO convened the Second Expert Consultation Meeting on Floriculture Development in Asia in Kunming, China from 7 to 9 January 2010. Floriculture experts from ten nations (Bangladesh, China, India, Lao PDR, Nepal, Philippines, Republic of Korea, Sri Lanka, Thailand and Viet Nam), as well as local observers and FAO officers participated in the meeting. The Expert Consultation reviewed the status of floriculture in the region, flagged the factors constraining the growth of the sector and planned a strategy for addressing these constraints. Two keynote papers, namely Production dynamics for global floriculture and The competitive edge for Asian floriculture and the country reports provided the basis for discussions.

The Expert Consultation confirmed the growing status of the region in the international floriculture industry. With the largest production base in the world (China and India) and agroclimatic conditions suited to the production of all major floriculture products almost throughout the year in some part of the region, Asia truly has the potential of becoming a superpower in the global floriculture business. China and India have huge domestic markets and most of the countries in the region have initiated exports to markets all over the world, especially to Japan, which, after Europe and the United States, is a major importer of floriculture products.

The Expert Consultation enabled an assessment of the inherent strengths as well as the challenges in realizing the true worth of this global business. The major constraints/obstacles include:

- a. lack of authentic information/databases to plan appropriate developmental initiatives;
- b. poor access to production inputs, particularly quality planting material;
- c. inadequate research and development support in most parts of the region;
- d. weak floriculture extension services and technology dissemination programmes;
- e. low awareness of quality certification in production such as Good Agricultural Practices (GAP), integrated pest management (IPM) etc. and post-harvest management;
- f. poor/unorganized market infrastructure and absence of market intelligence; and
- g. lack of harmonization in plant quarantine regulations affecting the marketing in the region.

The recommendations that emerged from the Expert Consultation should enable the planning of short-term and long-term measures for creating an enabling environment for the Asian floriculture industry to blossom.

It is believed that this report will be useful for the further development of floriculture in this region and FAO welcomes feedback from the users of this report.

Hiroyuki Konuma
Assistant Director-General and
Regional Representative for Asia and the Pacific
Food and Agriculture Organization of the United Nations

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Executive summary

The FAO Regional Expert Consultation on Floriculture Development in Asia was held in Kunming, China from 7 to 9 January 2010. Floriculture professionals from Bangladesh, China, India, Lao PDR, Nepal, Philippines, Republic of Korea, Sri Lanka, Thailand and Viet Nam, participated in the Expert Consultation together with representatives of FAO. Observers from China Agricultural University, Yunnan Academy of Agricultural Sciences (YAAS) and the Flower Research Institute, which is part of YAAS, also attended the meeting.

Subash Dasgupta, Senior Plant Production Officer, FAO Regional Office for Asia and the Pacific, Bangkok (Thailand) welcomed the participants and presented the opening address. He stated that this Second Expert Consultation meeting had been convened to review the present status of the sector and plan the future course of its development, keeping in mind the significant growth witnessed in the Asian floriculture industry since the First Expert Consultation meeting was organized in Bangkok in 1997.

The main objective of the Expert Consultation was to strengthen cooperation among the countries of the region through information sharing on initiatives and networking to derive benefits from their inherent competitive strengths.

In his address, Mr Dai Luyuan, Vice President, YAAS, highlighted the rich biodiversity of Yunnan and the effective utilization of the available germplasm resources, which have helped it to emerge as the major player in China's increasing presence in the global floriculture industry. With the active support of the Chinese government, Yunnan is expected to become the largest export base for floriculture in Asia by 2020.

Dr N.K. Dadlani (India) in his keynote paper Production Dynamics for Global Floriculture briefly discussed the new paradigms which impact the international floriculture production systems. The major requirement for producing for global markets is to focus on sustainable development, i.e. development which meets present needs without jeopardizing those of future generations. The challenge of sustainable development for the ornamental plant industry is to achieve a balance between the social and economic development of the enterprise, while conserving the environment.

Dr You Jie, China Agricultural University, in his keynote paper The competitive edge for Asian floriculture reviewed the growth of floriculture in China during the last two decades and emphasized the similarities in production and use of floriculture produce among the Asian nations. Dr You stressed the emerging role for Asian floriculture in global trade. With tropical to temperate climatic zones suited for production of a range of products, the region can be the major production hub for floriculture. Cooperation among the countries in the region in identifying and developing novelty types from the vast available natural biodiversity will enable them to develop products for which they are likely to have a competitive edge. Similar lifestyles and cultures in most Asian countries make intraregional trade easier.

Country reports

Dr Kabita Anzu-Man-Ara, Bangladesh, informed the participants that because of increasing domestic demand and the possibilities for exports, floriculture has emerged as a lucrative profession with much higher returns than most field and even some horticultural crops. With a production base of about 10 000 hectares, 70 percent of which is under flower production, commercial floriculture is being practiced by 10 000 to 12 000 farm families, providing direct/indirect employment to more than 100 000 persons. Almost all the production (>96 percent) is being practiced under open field conditions, mainly for the local markets. Extension and consultancy services are very poor. Farmers are generally guided through knowledge sharing among themselves. Awareness of GAP, IPM, quality certification, organic farming etc. is very limited. Skilled manpower in commercial floriculture is limited. Few avenues for capacity building are being provided by either the government or private sector. Knowledge and infrastructure for post-harvest management is also limited. The turnover of the domestic market is about US\$57 million, whereas exports are valued at US\$55 million.

According to the presentation by Dr Yang Shuhua, China ranks number one in the world in production area under floriculture. The country now has 775 500 hectares (2008) devoted to floriculture production, with more than half of the area being occupied by landscape trees. Floriculture producers source planting material both locally and overseas. The traditional varieties, mainly of landscape trees, are multiplied and sourced locally, whereas for cut flowers the material is usually sourced from breeders abroad. In view of the government subsidy for greenhouses, the area has increased nearly ten times during the last decade and now covers approximately 64 000 ha (2008). A strong network of research and development (R&D) centres for floriculture now exists in China. China has a comprehensive agricultural extension service at local and national government level and this also attends to floriculture extension. Moreover, it is obligatory for floriculture experts to provide extension and consultancy services. During the last six years, more than 50 000 technicians have been trained for floriculture work.

Dr N.K. Dadlani highlighted the role of flowers in Indian culture. He mentioned that the area under cut flower production has increased significantly. With an estimated area of 160 000 hectares (2007/08), India generates a total production of 870 MT of loose flowers and 4 341 MT of cut flowers. During the early 1990s, a new dimension to flower production was introduced with many farms being set up for export oriented production as joint ventures with technology and marketing support from Holland and Israel. Commercial floriculture in India is still practiced on small farms. The cluster farming approach is also picking up. The export oriented production has also seen size expansion from the average of two hectares to four hectares now. Investments in GAP and quality certification as well as the adoption of IPM are still low. The floriculture sector has emerged as a good source of employment, particularly for rural labour who can work close to their households. Regular training programmes as part of government development initiatives are helping to build the capacity of workers at different levels.

Dr Hye Kyung Rhee, Republic of Korea, stressed the competitiveness of flowers in international trade. She mentioned that with the development of the Korean economy, floral

products are now worth more than US\$900 million with exports valued at US\$76 million. Cut flowers are the main floriculture product in South Korea occupying 32 percent of the total area (7 075 ha) under floriculture production in the country (2008), followed by landscape plants (28 percent) and potted plants (18 percent). Among cut flowers, rose (34 percent) and chrysanthemum (29 percent) constitute nearly two-thirds of the total production of 1 240 million stems (2008). Floriculture generates employment for nearly 12 000 households, and for 70 percent of these it is a full time occupation. Planting material in the case of most crops is largely imported. The floriculture extension and consultancy services are weak. Nearly 60 percent of the floriculture producers have farms 2 000 to 8 000 sq m in size. Most farms are equipped with basic post-harvest management infrastructure. More than 90 percent of the value of floriculture products is realized in the domestic market. Japan accounts for over 90 percent of the cut flower exports from South Korea. In the domestic market, the floriculture produce is sold through five auction markets and wholesalers.

According to Mr Bounkong Souvimonk, floriculture in Lao PDR is yet to achieve the stage of commercialization. The emphasis is on ornamental plants production for home decoration rather than flower production. There is a total lack of information about the status in terms of area and production of floriculture products in the country. The size of the industry amounts to about 100 shops (500 to 1 000 m² size) in Vientiane, the capital city of the country, which produce and sell about four million plants. Private nurseries propagate indigenous varieties of floricultural crops for production in the capital region and around other major cities. Intellectual property (IPR) laws, though in place, are not well understood. Production inputs like fertilizers (organic and inorganic) and plant protection chemicals are available and used based on accumulated experience rather than technical guidelines. Greenhouse production is not practiced at present. Floriculture, not being a major agriculture crop in the country, does not receive priority for extension support. Development of the sector is also affected by poor availability of skilled manpower. As ornamental plant production is the main activity in the floriculture business, the need for organized prognostics and health management (PHM) infrastructure is not felt. Government support for the floriculture sector in Lao PDR is negligible.

In the country report on Nepal, Dr Umed Pun mentioned that although floriculture began in Nepal six decades ago, its organized commercialization started from the early 1990s with the formulation of the Floriculture Association of Nepal (FAN). The floriculture sector has grown steadily during the last two decades with the total number of enterprises (nurseries) increasing to 600; more than 50 retail florists and about six wholesale shops, boosting the turnover to US \$3 million. The total area under floriculture production is about 80 hectares (2007) including 30 hectares under protected cultivation. Gladiolus and rose are the two main crops. Most of the planting material used in floriculture production is imported. The planting material suppliers engage in some technology transfer for production. Facilities and knowledge of post-harvest management are limited. Because of the small size of their farms (<0.25 ha), the farmers generally engage in production using family labour only and awareness of Global GAP or IPM, quality certification labels and organic farming, is limited. There is shortage of skilled manpower for floriculture in Nepal. Use of scientific post-harvest handling by floriculture producers is limited.

Mr Rex Victor P. Puentespine, presenting on the floriculture status of Philippines, noted that because of the increased exports of floriculture products, commercial floriculture is slowly being recognized as an important economic sector. Commercial floriculture is reported to be practiced in all parts of the country but only an estimated 500 hectares are under cut flower production. For most of the production, the planting material is imported. The high cost of production inputs is a major challenge to all farmers. Most of the production infrastructure of greenhouses is now locally designed and built using locally available material. The R&D support for floriculture is very limited. There is apparently a total absence of floriculture extension services and most of the technical know-how for production is provided by foreign suppliers of planting material and production inputs. Because of the small farm size, cluster farming is practiced in some areas. There is a shortage of trained manpower and floriculture skills are learned mostly through experience. In the absence of scientific knowledge on post-harvest management, most farmers have their own use protocol. The majority of the floriculture produce in the country is for domestic market consumption. Only about 10 percent is exported to Japan and Europe. An organized marketing infrastructure for floriculture produce is lacking. Most producers sell their produce through traders.

In her presentation on floriculture in Sri Lanka, Ms Krishnarajah pointed out that floriculture is mainly sustained by private sector participation. Sri Lanka's exports of floriculture products is valued at Rs1 500 million (2008). There are approximately 30 export production units. Floriculture sustains about 4 000 people from the semi-urban and rural sector. Cut foliage and live potted plants account for more than 90 percent of the value of exports. Sri Lankan floriculture products have been exported to Europe (44 percent) and Asia (40 percent) mainly. Recently, the countries of the Near East are emerging as major market destinations (13 percent). Floriculture development programmes have received a boost since 2005, with government interventions making available quality planting material, on site extension services and training programmes and published information to farmers' groups organized in major production districts. A low population base and near saturation of the local markets with traditional products, encourages the development of value-added products, identification of niche markets and the promotion of export production.

Mr Anek Chaiapichitphaibul highlighted the importance of floriculture in Thai culture. He stressed that in view of the high value, higher returns per unit area as compared to other crops, and the export potential, the floriculture industry is now well established in Thailand. The country has been exporting tropical orchids for the last forty years. Floriculture production is being practiced on more than 12 000 hectares (2006). Floriculture producers in Thailand have good access to and use quality planting material. Production is done in open fields and under the protected environment of plastic greenhouses/shade houses. The high costs of chemical fertilizers and other materials have led to the more efficient use of inputs. In view of the export orientation of the country's floriculture sector, the government considers infrastructure and the implementation of efficient post-harvest management to be important.

Ms Ly Nguyen Thi Kim, in her presentation of floriculture in Viet Nam, stated that despite flower production being a traditional activity in the country and the soil and climatic conditions being suitable for round-the-year production, it occupies only 0.12 percent of the total

cultivated area. In most parts of the country, it is the business of smallholders and has not become a significant industry, largely because of the small market size. The area under flower production in Viet Nam covers less than 10 000 hectares. There is no established system for making available quality planting material in sufficient quantities, either in the public or private sector. Most production is practiced in open fields. Technology support for the sector is limited, but efforts are underway to strengthen this important area. The country lacks trained manpower for commercial floriculture and wherever it is available it lacks commercial orientation. There is no systematic post-harvest handling of the produce. Marketing of cut flowers at present is highly unorganized. The development of marketing infrastructure and market intelligence is weak. Most of the production is undertaken for local markets. Earlier, some production was being exported to Russia and East Europe. Now, a small amount of floriculture produce is being exported to Europe, China and Thailand.

Recommendations

Based on the discussions of the constraints/obstacles to the potential development of floriculture, the Expert Consultation recommended that floriculture be recognized as a priority area and on the basis of a comprehensive survey of the status of the sector, the participating countries should prepare appropriate plans for development, with supporting government policy interventions and FAO technical support. Floriculture development must use environment-friendly technologies for production and post-harvest management. Networking among the countries for effective information exchange/sharing, and capacity-building programmes for critical areas should receive attention.

I. INTRODUCTION

1. The FAO Regional Expert Consultation on Floriculture Development in Asia was held in Kunming, China from 7 to 9 January 2010. Floriculture professionals from Bangladesh, China, India, Lao People's Democratic Republic, Nepal, Philippines, Republic of Korea, Sri Lanka, Thailand and Viet Nam participated in the Expert Consultation, together with representatives of FAO. There were observers from China Agricultural University, Yunnan Academy of Agricultural Sciences (YAAS) and Flower Research Institute, which is part of YAAS, at the meeting. The list of participants is given in Annexure 1.
2. Subash Dasgupta, Senior Plant Production Officer, FAO Regional Office for Asia and the Pacific, Bangkok (Thailand) presented the opening address as well as welcomed the participants on behalf of Hiroyuki Konuma, Assistant Director-General and Regional Representative, FAO Regional Office for Asia and the Pacific, Bangkok. He mentioned that this second Expert Consultation meeting (the first one was organized in Bangkok in 1997) has been convened to review the present status of the sector and plan the future course of development, keeping in mind the significant growth witnessed in the Asian floriculture industry recently. Dai Luyuan, Vice President of Yunnan Academy of Agricultural Sciences, was also present during the opening session.

II. OPENING SESSION

3. In his opening address, Subash Dasgupta mentioned the increasing global importance of the floriculture sector and its significant role as an instrument for income generation leading to poverty alleviation. He underlined that the twin objectives of any agriculture diversification effort is to increase opportunities for income generation and employment. Commercial floriculture, which offers good opportunities in these areas, has accordingly been recognized as a viable economic activity and large areas previously under field/food crop production are now given over to low volume, high value floriculture products.
4. The Asian region has emerged as a major production hub, supplying a range of quality products to global markets. Mr Dasgupta stressed that the competition is fierce, continuously testing the adaptive capacity of the actors involved. Because of the highly perishable nature of the produce and considerable price fluctuations, the sector requires that producers be highly knowledgeable and alert.
5. In order to consolidate their rightful position in the international floriculture markets, as reliable suppliers of consistent quality produce, Asian floriculture growers need to involve themselves in a production strategy that complies with global social and environmental production practices. Floriculture is recognized as the original green industry and future efforts to develop it should aim to make it greener, leaving a positive effect on the planet.
6. The main objective of the Expert Consultation was to strengthen cooperation among the countries of the region, through information sharing on initiatives and networking, to

derive benefits from the region's inherent competitive strengths. Mr Dasgupta emphasized the role of FAO in providing technical assistance and cooperation, and facilitating strengthening of developmental programmes through donor support. The FAO regional office recognizes the contributions that floriculture production can make to improving the livelihoods and quality of life of small farmers of the region and is continuously seeking ways to build on the benefits of the sector. He mentioned the approval of a Technical Cooperation Programme (TCP) project on assistance to the floriculture sector in Viet Nam that is to be implemented soon. He looked forward to the Expert Consultation recommendations to help prepare an implementable blueprint for the development of the sector.

7. In his address, Dai Luyaan, Vice President, YAAS, welcomed the participants to Yunnan province, which is the major floriculture production base for China. He highlighted the rich biodiversity of the area and effective utilization of the available germplasm resources, helping it to emerge as the major player in China's increasing presence in the global floriculture industry. He stressed that, with the active support of the government, the region is expected to become the largest export base in Asia by 2020. Mr Luyaan expressed the hope that successful completion of this Expert Consultation would help to build up collaboration between FAO and YAAS to work jointly in the future in this rapidly developing sector. He thanked FAO for selecting Kunming as a venue for this important event and assured continuous support from YAAS in the future.

III. OBJECTIVES AND AGENDA

8. Mr Dasgupta briefly presented the rationale for organizing the Expert Consultation. He presented the objectives, the provisional agenda (Annexure 2) and the details of the programme (Annexure 3), which were duly adopted. The objectives of the consultation, in brief, were as follows:
 - a. Review the status of floriculture production in Asia;
 - b. Identify the opportunities for floriculture in world trade;
 - c. Develop a strategy for floriculture production and marketing systems complying with WTO requirements; and
 - d. Propose suitable collaboration among member countries for harnessing their true potential as floriculture producers.

IV. KEYNOTE PRESENTATIONS

9. Dr N.K. Dadlani from India presented the keynote paper Production Dynamics for Global Floriculture. In his presentation, Dr Dadlani briefly discussed the new paradigms that impact international floriculture production systems. The major requirement in producing for global markets is to focus on sustainable development, i.e. development which meets present needs without jeopardizing those of future generations. The challenge of sustainable development for the ornamental plant industry is to achieve a balance between the social and economic development of the enterprise, while conserving the

environment. Equal attention needs to be paid to the three Ps – the planet, people and profits. Increasing costs for environmental management in greenhouses and growing concern for the carbon footprint necessitate adoption of sound, socially relevant and environment-friendly production practices.

10. In a highly competitive industry, one way of ensuring viability is to pay attention to volumes. To ensure sustained supplies one needs to have large farms which can generate consistent volumes of acceptable quality. Because of decreasing landmass/production area in most parts of the Western world, the focus in production is shifting to Africa and Asia. Production systems are being designed to achieve optimum utilization of the space.
11. Increasing energy costs in most parts of the world have compelled producers to adopt practices that would enable quality production with bearable economic impact. Switching to solar panels for heating by a few farmers in Kenya has shown the way for environment-friendly sustainability with considerable energy saving. The reduced humidity, more than the temperature increase, helps in better disease management, resulting in a 15 to 20 percent production increase.
12. Reduced availability of chemicals for soil preparations and increasing costs for disease management in the growing media, have in recent times led to significant increase in using various substrates, as a replacement for soil. Rose production in the Netherlands (90 percent) and Israel (100 percent) is being practiced in soilless media. Various substrates are being used, with the most common being cocopeat. Studies in major production farms in Europe, South America etc. have shown that although the initial start up costs for substrate farming may be a bit high, they are easily offset by the increased production (about 20 percent) yields.
13. Selection of crops and the varieties to be grown is another important consideration. Rose breeders across the world are focusing on developing the production of location-specific varieties with good market acceptability. Crop diversification with a view to capitalize on local strengths or to cater to a niche market is another important production factor. Peony as a cut flower (Israel), Calla lily (New Zealand), Phalaenopsis pot plants (Southeast Asia), cut foliage (Sri Lanka, African tropics etc.) are increasingly been grown the world over, with sizeable market demands. Production of gerberas for outside markets has picked up after innovative packing systems for shipping gerbera cut flowers (wet/dry) were developed.
14. Environmental concerns have forced flower growers all over the world to adopt IPM measures, which have proved economically useful, resulting in improved gains in quality and providing better returns to growers.
15. The last years have altered the perspective of ornamental producers with a consensus being reached about the unsound environmental and social practices in greenhouses. Some environmental groups have partnered with growers to develop standards that are feasible both in an environmental sense and a business sense. Floriculture production

labels like MPS, Global GAP etc. represent measures which satisfy the consumers with socially and environmentally sound practices, and at the same time satisfy the bottom line of growers.

16. The high cost of introducing new varieties to meet the changing requirements of the floriculture industry, often considered a fashion trade, has compelled the breeders to enforce breeders' rights. The introduction of an enforceable IPR regime in most floriculture production centres has contributed to stopping piracy and supporting creativity.
17. Significant changes in marketing channels, particularly in Europe, with an increasing share of supermarket sales, has altered the growers' perceptions about important production factors. Better quality produce, a wide range to suit varied tastes and guaranteed long vase life, are criteria supermarkets demand for positioning the produce for marketing.
18. An important component of overall profitability in the flower industry is the marketing cost. Increasing freight costs because of rising fuel prices, have led to producers



investing in shipping through sea routes. Increased sea traffic on the Netherlands – United States, Viet Nam – Japan, Ecuador and Colombia – Europe, and Israel dush Europe sectors, is a testimony to the sustainability of this mode of transporting flowers across the world. Besides lower costs, sea transportation also involves reduced energy consumption and lower CO2 emissions.

19. You Jie of China Agricultural University presented a keynote paper titled The competitive edge for Asian floriculture. Reviewing the growth of floriculture in China during the last two decades and emphasizing the similarities in production and use of floriculture produce among the Asian nations, Dr You stressed the emerging role for Asian floriculture in global trade.
20. When commercial floriculture assumed industry proportions in the late 1980s, China visualized the significant growth of the sector, with expectations of achieving an annual trade in floriculture products of about US\$200 million by 2000. However, a review of production and trade in 2000 revealed total floriculture trade value as RMB16.3 billion, with exports worth US\$28.3 million. After six years, the trade value increased three and a half times to RMB55.6 billion, with exports value more than doubling to US\$60.91 million. The export growth has been significant, particularly during 2004 and 2005, when the value exceeded US\$150 million. The production has now stabilized. In 2008, China had the largest production base in the world with over 600 000 hectares spread throughout the country. The trade turnover was more than RMB60 billion and the export value was about US\$40 million.
21. The phenomenal growth of floriculture in China has contributed to the increased use of floriculture products in everyday life, fuelling the growth of the domestic market. Dr You opined that as the domestic market is a base for international trade more attention should be paid to its development.
22. Most of the crop varieties being produced in China, as in other Asian countries, have been obtained from developed nations, mainly in Europe. More often than not, there is no particular advantage for the Asian nations in their production. All varieties of rose, marigold, lilies and other bulbous ornamentals etc. being produced have been bred mainly in Europe and the United States and are better suited to their climates. The quality of the produce from China and other Asian countries thus falls short of the expectations of the international markets. Exposure to production practices and effective post-harvest management systems to tailor the produce for a discerning global market is lacking.
23. The Asian region abounds in climatic resources. With tropical to temperate climatic zones suited to the production of a range of products, the region can be the major production hub for floriculture. With large areas of production, mainly in China and India, the region is the world's largest production base. Cooperation among the countries in the region in identifying and developing novelty types from the vast available natural biodiversity will enable Asian countries to develop products that are likely to have a competitive edge.

24. Similar lifestyles and cultures in most Asian countries make trade among them easier. Huge domestic markets in some of the countries such as China and India improves the trade for them, besides opening up export avenues for neighbours in the region. Strong cooperation among the Asian nations in the flower trade will make the region a superpower in the sector and together Asian countries will be able to dictate the trading terms in the expanding global business.
25. Dr You recommended that through active regional cooperation in breeding of varieties and developing suitable protocols for production and post-harvest management, the Asian region can advance greatly in the international trade in floriculture.
26. Jinze Li of the Flower Research Institute of Yunnan Academy of Agricultural Sciences made a presentation on Yunnan Flower Industry – achievements, impediments and suggestions. Dr Li noted that Yunnan, which accounts for nearly 50 percent of Chinese floriculture production, is perhaps the largest single production base for cut flower production in Asia. The diverse climate and topography helps Yunnan in having the largest diversity of plant life and agricultural crops in China. More than half of the nearly 30 000 kinds of higher plants found in China are present in the province.
27. Floriculture, more particularly cut flower production, started in Yunnan in 1989 and @ within five years Yunnan had become the leader in the sector and a pillar of the agricultural industry, contributing significantly to the finances of the Yunnan provincial government. The reported area under cut flower production in Yunnan is 35 000 hectares (2008) and it has a total output value of RMB17.6 billion, accounting for 3.1 percent of the provincial GDP. Exports worth US\$101 million reach 35 countries. Yunnan has a wide product line and accounts for a significant share of the Chinese production of rose and lilies (45 percent), carnation, lisianthus, potted cymbidium, gypsophila and limonium (70 percent). The northwest and northeast parts of Yunnan, with their climate like that of the Netherlands, have become a production base for bulb production (tulip, lily). The province also has a large area under jasmine and marigold, produced for the tea and food industries. Moreover, Yunnan is the major production base for landscape trees, which are in great demand all over China.
28. Despite the extensive floricultural activity catering to both domestic and export markets, the production system in Yunnan has remained simple and 90 percent of the cut flower production is under locally fabricated greenhouses using local material such as bamboo/ wood, concrete pillars/steel frame. Some of these structures, though face problems in, particularly during periods of snowfall. Most producers use surface irrigation and it is only the big players who have installed micro-irrigation systems. Many farmers have taken up substrate (soilless) culture, but have problems of nutrition recycling. The large companies also invest in environmental management (heating) and post-harvest management systems, which are beyond the reach of a majority of producers because of high costs.



29. Marketing of the floriculture produce is mainly handled by two wholesale markets: Dunnan Flower Market, which caters to a majority of small producers), and is ranked the biggest flower market in China with a sales turnover of RMB3 billion (2008); and the Kunming International Flower Auction, which since its start in 2003, has grown rapidly, with a supplier base of more than 5 000 producers, many of them supplying as a group/ association as higher volumes get better prices.
30. Because of the lower quality of its produce, Yunnan faces stiff competition from neighbouring countries like Malaysia, Philippines and Viet Nam, in supplying Japan, the largest importer in the region. The effect of the microclimate of the production area reduces the yield and encourages disease. High heating costs for greenhouses, besides environmental concerns, and distance to target markets are major factors that are encouraging the Yunnan producers to utilize vertical climate resources for product/ location diversification to achieve low cost and ecologically friendly production. The use of solar greenhouses, tropical greenhouses with outside shading, is increasing.
31. In order to capitalize on its natural resources, particularly its biodiversity, and reduce the cost of production by saving on royalty payments, the Yunnan floriculture industry is focusing on developing new varieties more suited for production in the Chinese environment. Among the measures being adopted to boost the growth of the Yunnan floriculture industry further are: more attention to post-harvest management to improve

the quality of produce reaching the local markets as well as for export; greater use of the fast moving, extensive Chinese rail network to reach the markets in China/Japan quickly (efforts have been initiated to establish a railway cool chain system). The Yunnan floriculture industry is the major player in the Chinese floriculture industry and accounts for half of the sector's value and provides more than 200 000 job opportunities, particularly in rural areas. It faces many challenges, but is emerging as the "Kingdom of Flowers" with the participation of producers, researchers and the government.

V. COUNTRY REPORTS

Bangladesh

32. Kabita Anzu-Man-Ara presented on the floriculture situation in Bangladesh. Floriculture, which had in the past involved cultivation of flowers and ornamentals for various religious and cultural festivals, has now become important not only for its aesthetic and social values, but also for its economic contribution. Because of increasing domestic demand and the possibility of exports, floriculture has emerged as a lucrative profession with much higher returns than most field and even some horticultural crops.
33. With a production base of about 10 000 hectares, 70 percent of which is under flower production, commercial floriculture is being practiced by 10 000 to 12 000 farm families, providing direct/indirect employment to more than 100 000 persons. The major production belts of small farm clusters are in Jessore, Savar, Gazipur, Mymensingh, Dhaka and Chittagong. Almost all the production (>96 percent) is being practiced under open field conditions, mainly for the local markets. The major crops are tuberose, rose and gladiolus. Farms are small (average <0.5 ha) and generally owned by individuals.
34. Producers' access to quality planting material and new varieties is at present limited. Most new planting material is introduced by private sources and the quality assurance system for planting material is poor. Intellectual property rights (IPR) compliance under the Plant Varieties Act of Bangladesh and strict plant quarantine regulations govern the import/export of planting material.
35. The availability of chemical fertilizers and plant protection chemicals is limited and most growers have poor knowledge about the appropriate doses and therefore generally follow the advice of the input dealers. Most of the farmers use the flood irrigation method. Floriculture research, mainly on the development of new varieties and standardization of production technology packages for open field production is being done mainly at Bangladesh Agricultural Research Institute (BARI). The private sector's contribution to R&D is negligible. Extension and consultancy services are very poor. Farmers are generally guided through knowledge sharing among themselves and from some publications (production manuals etc.) developed as part of government/donor supported projects. Farmers' awareness of GAP, IPM, quality certification, organic farming etc. is very limited.

36. Skilled manpower in commercial floriculture is limited. Few avenues for capacity building are being provided both by government and private organizations. About 70 percent of the workers are males and they receive higher wages than the female workers.
37. Knowledge and infrastructure for post-harvest management is limited. Recently a small packhouse was established with European Union (EU) assistance at Jessore, on the initiative of local farmers. There are no standard/grades for flowers in the country and material and systems used for packing are primitive and poor. Flowers are transported to major markets in Dhaka (Shabag) and Jessore (Gatkhal) mainly by road/rail. Some flowers are also exported to the Near East countries. The turnover of the domestic market is around TK4 000 million, whereas the exports are valued at TK3 840 million. Retail marketing is of flowers or value added bouquets etc. through small retail shops in major cities.
38. There are several growers' and traders' associations/societies in the country. Government support is very limited. At present, there are no programmes for credit support or crop insurance for the floriculture sector in the country.
39. Considering the income generating capacity of floriculture activity, particularly for smallholders, the country needs a comprehensive plan for the development of the sector.

China

40. The floriculture status in China was presented by Yang Shuhua from the Institute of Vegetables and Flowers of the Chinese Academy of Agricultural Sciences. China has a long history of floriculture with developments taking place during the King Wu Dynasty (495 to 476 BC), the Jin Dynasty (265 to 316 AD) and the Qing Dynasty (about the 1890s). The reformed policy regime leading to fast economic growth has invigorated the flower industry in the country in recent times.
41. China ranks number one in the world in production area under floriculture. The country at present has 775 500 hectares (2008) devoted to floriculture production, with more than half of the area being occupied by landscape trees. This phenomenal growth in area has mainly come about during the last decade or so and has achieved a growth rate of 1 000 percent. Except for the northern region and part of the western region, floriculture is being practiced all over the country. Whereas Yunnan and Guangdong provinces are the major zones for the production of cut flowers and cut foliage, Zhejiang, Jiangsu and Hainan are the zones for seedlings and landscape trees. Ornamental potted plant production is mainly centred in Guangdong, Fujian and Hainan provinces, and seeds and bulb production is concentrated in Hunan, Zhejiang and Liaoning. Production of all the floriculture products registered significant growth during the last decade. The production growth for cut flowers and leaves, potted plants and seeds was about 500 percent, the other products i.e. seedlings and landscape trees registered a lower growth rate of approximately 300 percent. Among cut flowers, rose occupies the maximum production area and accounts for the largest volume of cut flowers produced. Orchids, on the other hand, lead in the potted plants category.



42. Planting material is both locally sourced as well as imported. The traditional varieties, mainly landscape trees, are multiplied and sourced locally, whereas for cut flowers, the material is usually sourced from breeders abroad, although a few varieties are bred locally. As a member of the International Union for the Protection of New Varieties of Plants (UPOV) (1999), China complies strictly with the IPR regime, besides registering their own creations. Up to 2008, more than one fourth of the 800 varieties registered by Chinese breeders with the Ministry of Agriculture and National Bureau of Forestry, have been issued warrants. The quality of the produce is governed by the rules of the National Agricultural Standards (2008). Strict quality control for planting material is exercised. The import and export of planting material, and its domestic transportation, are subject to a host of national and regional plant quarantine rules.
43. The floriculture producers have good access to chemicals for nutrition and plant protection. Most farmers tend to use a mix of organic and inorganic fertilizers, as well as biofertilizers on their farms. Toxic pesticides, particularly based on organo phosphorus are banned. Greenhouse structures for floriculture production are now also fabricated locally and since 2009 the regional governments also provide subsidies for such production structures. During the last ten years, the area under greenhouses has increased nearly ten times and now covers about 64 000 ha (2008).

44. A strong network of R&D centres for floriculture now exists in China. The Chinese Academy of Agricultural Science, Guangdong Academy of Agricultural Sciences and the Yunnan Academy of Agricultural Sciences, have established research institutes devoted to floriculture. A few other local governments have also set up agricultural research institutes and R&D activity is also going on at several private farms. China has a comprehensive agricultural extension service at local and national government level that also attends to floriculture extension. Moreover, it is obligatory for floriculture experts to provide extension and consultancy services. There has been a 30 percent increase in floriculture enterprise and farmers between 2003 and 2008. During the past six years, more than 50 000 technicians were trained for floriculture work.
45. The post-harvest losses in the floriculture sector in China, are reported to be about 30 percent. This is largely because of the absence of appropriate post-harvest management knowledge and infrastructure at farm level. Few enterprises with export orientation have the required infrastructure. Most small growers use only hydration treatment for their flowers after harvest and pack them in low quality packages and transport them to markets without following any cold chain. There are many standards for floricultural products at national, regional and enterprise level, with the government having formulated seven grades under the National Standards of China in 2009. China has a large domestic market base with a turnover of more than RMB60 billion annually. The domestic market has increased six times during the last 11 years. Landscape trees and potted plants account for the top two positions in the domestic value of major products. Among cut flower sales, rose ranks the highest and under potted plants, orchids occupy the top position. The province of Yunnan tops in the production value for cut flowers followed by Guangdong and Liaoning whereas Guangdong ranks first for potted plants and Jiangsu for landscape trees. Floriculture exports from China have increased more than ten times during the last decade and are valued at US\$399 million (2008). Cut flowers and leaves, as well as potted plants, are the major products exported and the important destination markets are Japan, Holland, Republic of Korea, United States and Singapore. The marketing infrastructure in most places is small and unorganized, though there are about 100 000 markets (2008).
46. The China Flower Association (CFA), established in 1984, with a membership comprising enterprises, institutions and individuals, is the national level organization promoting the floriculture sector. At regional level, there are several associations working for the cause of floriculture producers, the major ones being the Yunnan Flower Association (YFA) and Guangdong Flower Association (GFA). Higher income from floriculture enterprises, as compared to field crops such as wheat, soybean (fifty times) or vegetables like tomato (five times), encourages farmers to diversify into floriculture. The Government of China considers floriculture to be a new and high tech industry and encourages investments in the sector with preferential policies for credit support and infrastructure subsidies. ICT support for the sector is mainly available in the form of market intelligence.



47. With strong support from the government, China is making efforts at improving its capabilities in production value and export earning through better production infrastructure, IPR compliance, research and extension services and PHM infrastructure.

India

48. N.K. Dadlani highlighted the role of flowers in Indian culture. With changing lifestyles, floriculture has now also acquired an economic dimension, besides its aesthetic significance. The availability of a varied agroclimate, low cost labour and skilled manpower and easy access to all production inputs has fuelled the growth of commercial floriculture in recent times. Fresh flower production is the main activity in the sector.
49. India's production of flowers earlier focused on loose (stemless) flowers, used more for religious offerings and in value added forms for decorations. In recent times, the area under cut flower production has increased significantly, but not necessarily at the cost of area under loose flower production. With an estimated area of 160 000 hectares (2007/08), India has become a large production base during the last fifteen years (1993/94: 53 000 ha). Although flower production is carried out all over the country, West Bengal (East), Tamil Nadu, Andhra Pradesh, Karnataka (all South) and Maharashtra (West) are the major

states for production. The large area under production generates a total production of 870 MT of loose flowers and 4 341 million cut flowers. The major crops used for loose flowers are marigold, chrysanthemum, jasmine, tuberose, crossandra, aster etc. whereas the major cut flower crops include rose, gladiolus, carnation, gerbera and orchids. During the early 1990s, a new dimension to flower production was introduced with many farms set up for export oriented production as joint ventures with technology and marketing support from Holland and Israel. The area under a protected environment is, however, small at about 500 hectares. A similar area under small plastic greenhouses (500 to 1 000 sq m) is used for production for domestic markets.

50. Major constraints in flower production in earlier times (1970s to 1980s), namely poor access to quality planting materials and small range of varieties, were overcome in the early 1990s with liberalized government policies for seed imports. At present, the producers have access to important commercial varieties in all major crops from leading breeders across the world who have appointed local licensed propagators/distributors. A good infrastructure base of tissue culture units is also available for multiplication of vegetatively propagated material. The Protection of Plant Varieties and Farmers' Rights Act 2001 addresses the concerns of IPR and stringent plant quarantine regulations ensure quality control of the imported plant material.



51. Indian floriculture has good access to production inputs of fertilizers (organic and inorganic) as well as plant protection chemicals. The use of formulations supplying trace elements as well as major nutrition elements, biofertilizers and biopesticides is on the increase. With the advent of protected floriculture, local companies fabricating and installing greenhouses have replaced the leading foreign suppliers who set up the greenhouses in the early 1990s. Water management is also now mostly based on scientific principles, with micro-irrigation (drip, sprinklers, foggers etc.) replacing surface (flood) irrigation on most farms.
52. Dr Dadlani informed the participants about the strong floriculture research and development network available in India, which has generated new varieties and crop/location specific production protocols. Developmental initiatives of the government have helped disseminate the technologies to the producers, who have benefited from the inputs. The floriculture extension support is weak, but is being strengthened with consultancy support from the private sector and public sector agricultural universities. Published information (manuals/bulletins/books) both in English and the local languages of the region is readily available.
53. Commercial floriculture in India is still practiced on small farms, but larger holdings are appreciated for their ability to generate larger volumes yielding benefits of economies of scale, and farmers are leasing more land to expand their enterprises. The cluster farming approach is also picking up. Export oriented production has also seen size expansion from an average two hectares to four hectares now. In view of the low quality consciousness of the domestic markets, investments in GAP and quality certification is limited. Several production farms for exports, however, have obtained Global GAP / EUREPGAP and MPS certification. Adoption of IPM is still low, but with increased availability of biological pesticides, appreciation of environment-friendly technologies is increasing.
54. The floriculture sector has emerged as a good source of employment, especially for rural women labourers who can work close to their households and who can therefore more easily manage their jobs and families. Regular training programmes as part of government development initiatives are helping to build the capacity of workers at different levels by providing them with the technical knowledge necessary for specialized commercial floriculture activity.
55. Post-harvest management is the weakest link in Indian floriculture production. In the absence of any established standards/grades for produce, the growers follow the demands of the market. Packaging of floriculture produce is often unscientific and uses paper cartons, bamboo baskets, jute bags etc. Transportation of produce is by road (public/private vehicles), rail and air. The arrival of flowers into domestic markets from export oriented units that have good post-harvest management infrastructure, as well as through imports, has created awareness about the quality achievable through good post-harvest handling. The government has started setting up community post-harvest management infrastructure to support producers who, because of their small sized operations, cannot invest in such support systems on their own. Post-harvest losses of about 25 percent are

likely to reduce with more technical inputs and adoption of quality (vase life) preserving/ extending measures. Value addition, particularly for loose flowers, is very common in view of the increased use of flowers in the country for decoration purposes.

56. India has a huge domestic market and the increased use of flowers as a gift option is further fuelling the annual growth of 15 to 20 percent. The ratio of domestic supply to exports for flowers is 3:1. The market is estimated to be worth US\$300 million annually. Delhi is the biggest market base for flowers, though large markets exist in Mumbai, Pune, Kolkata, Bangalore etc. In the absence of organized market infrastructure for floriculture produce, the true potential of the market is not realized. The government has set up three international standard auction centres, which are likely to become operational soon. An important aspect of floriculture produce marketing in India has been the start of exports to international markets. Although India still has a negligible share (<1 percent) of the global markets, the export of floriculture products has grown exponentially during the last decade. Dry flowers and plants constitute the major export product, but cut flower exports (90 percent, rose) have also increased significantly. The main markets are Europe (Holland, Germany, United Kingdom and Italy), United States and Japan. There has been considerable mushrooming of retail outlets across the country and there are roadside vendors as well as up-market shops selling floral arrangements of high value.
57. The Indian government recognizes the importance of floriculture and accords it the status of “extreme focus segment”. Several programmes of the Ministry of Agriculture and the Ministry of Commerce and Industry provide technical and financial assistance for small farmers producing for domestic markets and for export production units. Support is available for R&D, production infrastructure and market development.
58. The Indian floriculture industry is at present on an upward growth path. Over the years, the floriculture industry has matured and is organizing itself to capitalize on its strengths. The government is partnering the growth process and helping it to realize its true potential.

Republic of Korea

59. Hye Kyung Rhee’s country paper stressed the competitiveness of flowers in international trade. She mentioned that as a result of the development of the South Korean economy, floral products are now worth more than US\$900 million with exports accounting for US\$76 million. This indicates the prospects for the development of the sector in the country.
60. Cut flowers are the main floriculture product in the Republic of Korea occupying 32 percent of the total area (7 075 ha) under floriculture production (2008), followed by landscape plants (28 percent) and potted plants (18 percent). Among cut flowers, rose (34 percent) and chrysanthemum (29 percent) constitute nearly two-thirds of the total production of 1 240 million stems (2008). Kyungki, Kyongnam and Chungnam are the main production provinces for cut flowers. A little less than half of the total flower production area is under protected cultivation. Floriculture generates employment for

nearly 12 000 households and it is a full-time occupation for 70 percent of these. Cut flowers account for nearly 40 percent of the total wholesale value of floriculture products, with rose, chrysanthemum and lily contributing more than 70 percent of the value.

61. Planting material in the case of most crops is largely imported, with Holland being the source country. Access of producers to new varieties is limited, as most prefer to introduce varieties that are cheaper and more stable. Strict phytosanitary inspection and plant quarantine measures govern the import of plant material.
62. Farmers have good access to organic and inorganic fertilizers, as well as plant protection chemicals, including herbicides. For protected cultivation, most (85 percent) greenhouse structures are covered with plastic film. All kinds of water management systems (surface) micro-irrigation, hydroponic etc. are used in floriculture production. Extensive mechanization is practiced, both for production and post-harvest management.
63. The floriculture extension and consultancy services are weak. Production manuals for important cut flower crops have been published and are in extensive use. GAP, IPM and quality certification in floriculture production, are not the norm. Nearly 60 percent of the floriculture producers have 2 000 to 8 000 sq m area farms, with one-fourth of the farmers growing on an average farm size of about 0.5 hectare. More than 80 percent of the floriculture producers have more than five years of production experience. More female than male labourers are engaged in flower production, even though they are paid about 30 to 40 percent lower wages than males.
64. Most farms are equipped with basic post-harvest management infrastructure. Standard grades for major cut flower crops like rose, chrysanthemum, and lily are available for domestic markets. Most flowers are dry packed in sleeves and cardboard boxes, and transported by road to local markets and air lifted to export destinations and there are varying levels of post-harvest handling losses. Certain vase life enhancing chemicals are used in the hydration of flowers after harvest.
65. More than 90 percent of the value of floriculture products is realized in the domestic market. Because of the lower volumes, a few selected flowers such as lily and rose are exported. Japan accounts for over 90 percent of the cut flower exports from South Korea, the rest being shared by Russia, United States, Canada, Dubai and the European Union. Higher freight costs and requirements of special documents (for Russia), are the main reasons for lower exports to these countries. In the domestic market, the floriculture produce is sold through five auction markets and the wholesalers of Kyungboo.
66. Several growers' associations, e.g. the Association of Korea Floriculture (1969), Orchid Growers' Association (2003), Floriculture Growers' Association (2003), Cut Flower Association of Korea and Lily Growers' Association (2009) are contributing significantly to the development of the sector in South Korea. The Korean International Trade Association (KITA) regulates the export trade. The government supports the sector through assistance provided for building a cold chain infrastructure and sales promotion, as well as for the purchase of agricultural machinery etc.

67. Floriculture products in the Republic of Korea are for birthdays, weddings and graduation accounting for nearly 87 percent. With a limited production season (February to May), there are many opportunities for extending the off-season production.

Lao People's Democratic Republic

68. According to Mr Bounkong Souvimonk, floriculture in the Lao People's Democratic Republic is yet to achieve the stage of commercialization that would enable the country to be recognized as an important player in the Asian region. It is a peri-urban activity practiced by private sector players. The emphasis is on ornamental plants production for home decoration rather than flower production. There is total lack of information about the status in terms of area and production of floriculture products in the country, but there are about 100 shops (500 to 1 000 m² size) in Vientiane, the capital city of the country, that produce and sell about four million plants annually.
69. Private nurseries propagate indigenous varieties of floricultural crops for production in the capital region and around other major cities. Not many exotic varieties are available and access to new varieties is very limited. IPR laws, though in place, are not well understood. There are not many breeders in the country and thus the breeding programmes are weak. Researchers in the public sector institutions are engaged in developing protocols for production of different crops. Quality assurance for planting material is absent and plant quarantine systems are rarely tested for ornamental crops. Production inputs like fertilizers (organic and inorganic) and plant protection chemicals are available and used on the basis of accumulated experience, rather than science-based recommendations. Greenhouse production is not practiced, at present. The greenhouse structures and accessories need to be imported. Water management at farms comprises irrigation and the use of sprinklers.
70. The Horticulture Research Centre in Vientiane is mandated to develop floriculture in the country. Floriculture, not being a major agriculture crop in the country, does not receive priority for extension support. The sector has been developing slowly recently. Farmers are able to generate production on the basis of advice from consultants from both the public and private sectors. Production manuals/books related to floriculture are available in Lao, English and Thai languages, though there is a limited number of them. Awareness of GAP, IPM, organic farming or quality certification in production is very limited. Development of the sector is also affected by the lack of skilled manpower. Training programmes are organized for capacity building, though not on a regular basis. The majority of workers in the floriculture production business are women. Family labour is generally used. When employed from outside, the labourers are paid from US\$80 to US\$90 per month.
71. As ornamental plant production is the main activity in the floriculture business, the need for an organized PHM infrastructure is not felt. There are no established standards or grades. Cut flowers (rose and orchids) are usually wrapped in paper and packed in boxes. They are transported by private/public vans to the market. Post-harvest losses are

approximately 20 percent. All the production is consumed locally, mainly in big cities and used for decoration purposes. Flowers are marketed loose or in value-added forms such as flower cones, bracelets etc. through retail shops or roadside vendors.

72. Government support for the floriculture sector in the Lao People's Democratic Republic is negligible. Because of the small size of the industry, there are no producers'/traders' associations to promote the sector.
73. Floriculture, because of its ability to generate quality employment, particularly for women, as well as higher profitability as compared to other crops (20 times higher returns than rice), is gaining popularity as an economically viable way to diversify agricultural production.

Nepal

74. In the country report on Nepal, Umed Pun briefly traced the history of floriculture development. He noted that although floriculture began in Nepal six decades ago, the organized commercialization only started from the early 1990s, with the formation of the Floriculture Association of Nepal (FAN). The first retail shop was started in 1994 and the first wholesale shop in 1998. The export of floriculture produce started in 2008.
75. The floriculture sector has grown steadily during the last two decades with the total number of enterprises (nurseries) increasing to 600 - more than 50 retail florists and about six wholesale shops, boosting the turnover to Rs230 million (US\$3 million). Floriculture production (ornamental plants), cut flowers and cut foliage, is distributed from the southern plains to the hilly region, with major districts with a large production base being Chitwan, Makwanpur, Rupendehi, Jhapa, Sunsari and Mahatary in the plains and Kathmandu, Lalitpur, Bhaktapur, Dhading, Kavare, Nuwakot and Kaski, in the hills. The total area under floriculture production is about 80 hectares (2007) including 30 hectares under protected cultivation. Gladiolus and rose are the two main crops and these occupy the bulk of the production area.
76. Most of the planting material used in floriculture production is imported by private entrepreneurs and distributed throughout the country. There is no organized quality assurance system in place and the supplier generally ensures good quality. Even though Nepal is IPR compliant, the access to new varieties is very limited. The plant quarantine regulations govern the import and export of planting material and products.
77. Farmers lack access to quality production inputs of fertilizers and plant protection chemicals. With the deregulation of the fertilizers subsector by the government a few years back, chemicals fertilizers are imported and distributed by private sources. Awareness of the benefits of organic/biofertilizers is increasing and higher demand is forecasted. Protected cultivation of flowers has been adopted in recent times and the greenhouses are locally fabricated and installed at low cost. Only about one-third of the cultivated land has access to irrigation facilities and surface irrigation is generally practiced. Micro irrigation has been promoted in recent years.

78. Floriculture research has been taken up at some research centres, besides some preliminary work being attempted by FAN. With the shifting of floriculture under the control of the Ministry of Agriculture in 2006, efforts at improving the floriculture extension support services have been initiated. The planting material suppliers engage in some technology transfer for production. Facilities and knowledge of post-harvest management are limited. FAN has brought out some production manuals for important products, which are popular with the farmers.
79. Because of the small size of their farms (<0.25 ha), the farmers generally engage in production using family labour only. Awareness of Global GAP or other such practices is limited. There is little knowledge among farmers about IPM, quality certification labels and organic farming. Some training programmes about IPM have been organized by FAN in recent years. To meet the demand for large volumes in the local markets, the cluster farming approach is being adopted. The cymbidium farmers in Godavari area have organized themselves under a One Village One Product (OVOP) programme. In a few cases, the planting material supplier organizes clusters in major production belts and contracts their production for marketing.
80. There is shortage of skilled manpower for floriculture in Nepal. The smaller size of operations does not attract the trained graduates who opt for higher studies, rather than joining the floriculture sector, which at present is a low paying occupation. FAN, with the support of the government, is organizing training programmes to build the technical capacity of the farmers. The majority (60 percent) of the labour force is women, who are reportedly paid lower (up to 20 percent) wages.
81. Use of scientific post-harvest handling by floriculture producers is limited. Most farmers just hydrate their flowers after harvest, grade and bunch them as per market requirements and send them to major wholesale markets packed in simple locally available materials. Most transportation is by road, using both public and private transportation means. The post-harvest losses are estimated as 20 to 25 percent. There is little use of vase life extending chemicals and some value addition to the produce is being done by the florists at their level.
82. The share of the domestic sector in the exports is major and the lone export oriented unit accounts for nearly 10 percent of the total value of the produce. In value terms, ornamental plants constitute the major commodity share of the markets. The capital city of Kathmandu has the main flower market, whereas, smaller markets are being developed in the other important towns/cities. The wholesale shops lack the facilities for cold storage etc. The export oriented units maintain the cool chain in the marketing of their produce. Roses have been exported since 2008 to Germany, Japan and United Kingdom. Although several markets provide duty free preference to Nepalese flowers, exports have yet to pick up.
83. FAN is the lone association promoting the development of the floriculture sector in Nepal. It operates through one district committee and three commodity committees. At

present, there is no trade association. Government priority for the floriculture sector has been very low. It is only during the Tenth Five Year Plan (2001–2006) that floriculture has been identified for development in view of its high value products. There is no government subsidy or crop insurance for floriculture in Nepal and very little credit support is available.

84. Nepal recognizes the ability of floriculture to contribute to poverty reduction. Higher per unit income generation through floriculture (3 to 10 times as compared to vegetables such as radish and field crops such as kidney bean) is attracting investments in the sector, but the government support at present is limited.

Philippines

85. Rex Victor P. Puentespine presented the floriculture status of Philippines. He mentioned that in the absence of any official data, it is difficult to review the floriculture situation in the country. Even though young as an industry, commercial floriculture is slowly being recognized as an important sector because of the increased exports of floriculture products. The growth has been significant, as the hobby growing of 1980s has turned into a viable economic activity and the country's demand for floricultural products is largely met from local production. Large imports have now been replaced by increasing exports of selected products.
86. Commercial floriculture is reported to be practiced in all parts of the country. The major production areas include Benguet, Laguna, Cebu, Pampanga, Bulacan, Batangas, Cavite, Quezon, Panay, North Mindanao and South Mindanao. Details of the production area in these belts is not known but a rough estimate is that only approximately 500 hectares are under cut flower production. The other floriculture products produced include pot plants and cut foliage. Among cut flowers, rose and chrysanthemums account for over 75 000 million stems (2009), followed by orchids, gerbera, anthurium, gladiolus and lilies. The other flowers produced include carnations, tropicals (heliconia), lisianthus, aster etc.
87. For most of the production, the planting material is imported. In a few cases, e.g. orchids, locally propagated material is also used in commercial plantations. Although Holland remains the preferred source, particularly for chrysanthemums, gerbera, lilies, rose, anthurium, carnation and tropicals, the other countries for plant material sourcing include Malaysia (orchid, chrysanthemum), Thailand (orchid, tropicals, ornamental plants) and United States (tropicals, ornamental plants). As most of the production, except for that of small farmers, is IPR compliant, farmers have good access to quality planting material of new varieties from abroad. The government is trying to introduce the quality assurance seal for ornamental planting material, as with other agricultural crops. The plant quarantine officials work closely with the growers and the flow of planting material is smooth.
88. The high cost of production inputs is a major challenge to all farmers. Almost all the fertilizers are imported, thus making them expensive. In the case of plant protection

chemicals, the active ingredients are imported and repackaged by multinational companies for distribution. Most of the production infrastructure of greenhouses, is now locally designed and built using locally available material. High and strong winds make the life of these structures very short. Marginal farmers generally use manual watering because of the small size of farms. Large farmers, however, use locally manufactured microsprinklers etc.

89. The R&D support for floriculture is very limited. Most of the research in the country is focused on food crops. There is apparently a total absence of floriculture extension services and most of the technical know-how for production is provided by foreign suppliers of planting material and production inputs. Some consultancy services are also available as part of the grant programmes of international organizations. Almost all production manuals are imported.
90. Individual growers design their own programmes and the awareness of GAP is very limited. There is no standard protocol for IPM in the country, particularly because of the different macroclimates of the various production belts throughout the archipelago. There is no quality certification adopted in the cut flower production sector at present. Because of the small farm size, cluster farming is practiced in some areas, as is seen in Panay Island, Benguet and some other belts producing cut foliage and tropicals.
91. Most of the skilled manpower available in the country usually undertakes training with the intention of working abroad. There is shortage of trained manpower in the floriculture sector and skills in floriculture are mostly learned through experience. Nearly two-thirds of the manpower in the floriculture sector comprise women, who are usually associated with post-harvest management activities. The wages vary depending on the production zone and range between US\$4 and US\$8 per day.
92. In the absence of scientific knowledge on post-harvest management, most farmers have their own protocols. No national standards, uniformly adopted across the country exist. Producers use the grades/standards that suit their market demand. Produce from peri-urban areas, because of the proximity to markets, is transported in styropor boxes, which are recycled. Corrugated paper cartons are used to transport produce by air, which is a common means of transportation because of the country being a widespread archipelago. Sea freight for areas with travel times of less than 24 hours is used. Because of the high cost and poor availability at producers' level, the use of vase life extending chemicals is limited. Some of the high value crops and those produced for export are treated with chemicals.
93. The majority of the floriculture produce in the country is for domestic market consumption. Only about 10 percent is targeting exports to Japan and Europe. The major domestic market is in Metro Manila, followed by other key cities like North and South Luzon, Cebu, Davao, Iloilo etc. Organized marketing infrastructure for floriculture produce is lacking. Most producers sell their produce through traders. Only a few large producers have their own sales outlets in the major flower market at Dangwa. Most of the

flower marketing in the country is to meet the demand for religious events, weddings and funerals, but Valentines' Day is the most popular occasion for purchasing flowers. There are a large number of small retail shops in all major cities. Access to foreign markets is not fully exploited because of the low volumes of quality produce.

94. There are many trade associations/groups for floriculture in the country. The growers' associations at present mainly comprise hobbyists rather than commercial producers. The government does not provide any subsidy/assistance to the floriculture sector. Credit support for these enterprises is from commercial banks, which charge high interest rates.
95. The floriculture industry is a good avenue for generating quality employment, particularly for women in close proximity of their households, and also yields higher income than field crops or even vegetables because of faster turnover. It is growing steadily and emerging as a viable economic diversification strategy in the agricultural sector.

Sri Lanka

96. In her presentation of the country situation, Ms Krishnarajah mentioned that floriculture, which was only a hobby of the rich at the end of the Twentieth century, has emerged as an income and employment generating activity in Sri Lanka for people from all walks of life. Sri Lankan floriculture is mainly sustained by private sector participation. Flower production, which was earlier for worship, beauty and recreational purposes, is now an important source of foreign exchange earnings. With less than 0.2 percent share of the world trade, Sri Lanka's exports of floriculture products is valued at Rs1 500 million (2008). There are about 30 export production units. Medium level enterprises are growing steadily and the export basket includes cut flowers, cut foliage, live plants and planting material; cut flowers and ornamental indoor plants are produced to meet the local demand.
97. Floriculture sustains about 4 000 people from the semi-urban and rural sector. The enterprises in floriculture can be categorized into large (there are less than 20) with more than ten acres production base, and medium and small producers (over 1 000 of these) operating on farms less than ten acres size. Although the large producers with available expertise and infrastructure grow cut flowers, cut foliage and plants mainly for export, the small and marginal producers target the domestic market. The cut flowers for export include rose, chrysanthemum and carnation. However, cut foliage and live potted plants account for more than 90 percent of the value of exports. The value of cut flower exports has declined steadily over the last five years, largely because of higher domestic prices and replanting by the existing producers. The cut flowers also include anthuriums and orchids, e.g. cymbidiums. Whereas the large units are concentrated in the western province, the medium-scale or small-scale producers are evenly distributed between the tropical and temperate/sub-tropical zones.
98. Sri Lankan floriculture products have been exported mainly to Europe (44 percent) and Asia (40 percent). Recently, the Near East countries are emerging as major market destinations (13 percent). In Europe, the bulk (41 percent) of imports are by Holland,

whereas United Kingdom and Germany are the two other major buyers. Japan (86 percent) is the largest market base in Asia. Among the Near East countries, Saudi Arabia, and the United Arab Emirates are the two major importers. Although North America has a small (3 percent) share of exports, it has been a regular market for floriculture planting material.

99. The Department of Agriculture, under the Ministry of Agricultural Development and Agrarian Services (MADAS), is the nodal agency mandated with floriculture development. However, the major technical promotional work for floriculture is managed by the Department of National Botanical Gardens (under the Ministry of Sports and Recreation). Floriculture research and development is also done by the Council for Agricultural Research and Policy (CARP), Horticultural Research and Development Institute (HORDI) and University of Peradeniya. For export promotion and management, the Floriculture Produce Exporters Association (FPEA) is the primary non-government organization. The Export Development Board of Sri Lanka is the official export promotion body.
100. The floriculture development programme, particularly for small and marginal farmers, has been boosted since 2005, with government interventions making available quality planting material, on site extension service and training programmes and published information to farmers' groups organized in major production districts. Nearly two-thirds of more than 100 groups organized are functional. Training was provided to more than 16 000 participants at nearly 400 workshops during 2007/2008, and nearly 1 200 nursery site visits were made by extension workers; both have contributed to the building of local capacity for floriculture production.

The low population base and near saturation of the local markets with traditional products encourages the development of value-added products, identification of niche markets and the promotion of export production. Exploiting the growing potential in Near East countries offers a strategic opportunity for Sri Lankan floriculture because of the lower freight costs.

Thailand

101. Anek Chaiapichitphaibul highlighted the importance of floriculture in Thai culture, historically. Because of the high value, higher returns per unit area as compared to other crops, and export potential, the floriculture industry is now well established in Thailand. The country has been exporting tropical orchids for the last forty years. With a total export value of US\$1 09.7 million (2007) for floriculture products, Thailand ranks nineteenth in the world. With a share of 32 percent, it ranks second behind Holland (48 percent) in the orchid trade. Whereas Holland exports temperate orchids (*Cymbidium*), Thailand's main product is tropical orchids (*Dendrobium*).
102. Orchid flowers are the main floriculture product in Thailand and account for 99 percent of the total cut flower export value. Japan and the United States account for half of the

total orchids imports. Together, orchid plants (11 percent) and orchid flowers (65 percent) constitute three-fourths of the total floriculture export value (2008). The other products produced for export include live plants (other than orchids), dried flowers and foliage, cut foliage, bulbs and flower seeds. Floriculture production is being practiced on more than 12 000 hectares (2006). Orchids cover nearly 30 percent of the total area. Among other flowers, marigold (22 percent) ranks high in area coverage. The other cut flowers produced include jasmine, lotus, rose, chrysanthemum, curcuma, anthurium etc.

103. More than 3 000 farmer families are engaged in orchid cut flower production in Thailand. Nearly 95 percent of the cut orchid production is being done in six provinces, namely Bangkok, Nakhonpathom, Samutprakarn, Nonthaburi, Rachaburi and Ayudhaya. Dendrobium varieties account for 90 percent of the cut orchid production. The other tropical orchids produced include Aranda, Mokara and Oncidium.
104. Despite being a major exporter of floriculture products, Thailand also imports sizeable quantities of live plants and cut flowers (other than orchids) etc. valued at US\$8.3 million (2008). The cut flowers imported into Thailand include rose, carnation and lilies from China and chrysanthemum from Malaysia.

Floriculture producers in Thailand have good access to, and use quality planting material. Production is done in open fields and under protected environments of plastic greenhouses/shade houses. The high costs of chemical fertilizers and other materials has led to more efficient use of inputs. Organic fertilizers and biological controls for pests are increasingly used to reduce costs as well as for environment protection. Mechanization is also being practiced to reduce the high cost of labour. Because of the export orientation of the country's floriculture, the government gives importance to both infrastructure and implementation of efficient post-harvest management.

105. Small growers usually sell their cut flowers locally. When there are many small growers in a village, the local collectors collect flowers from growers to sell in the major city markets. The largest wholesale market in Thailand for cut flowers is Pak Krong Talad in central Bangkok. The other large wholesale markets include Talad Thai and Talad Si Moom Muang. For ornamental plants, the largest wholesale market is Chatuchak.
106. Although Thailand continues to reign supreme in the orchid flowers and plants trade, efforts are underway to diversify the product mix, to take advantage of favourable agroclimatic conditions.

Viet Nam

107. Ly Nguyen Thi Kim in her presentation of the floriculture status in Viet Nam, stated that despite flower production being a traditional activity in Viet Nam and the soil and climatic conditions being suitable for round-the-year production, it occupies only 0.12 percent of the total cultivated area. In most parts of the country, it is the business of smallholders and cannot be established as a viable industry, largely because of the small

market size. However, since 1986, with the economic reformation process and the raised living standards of people, the area under floriculture has improved significantly. More crops have been introduced into commercial production and research on the development of new varieties and the standardization of production technology have been initiated. With foreign investments being made in the sector, Viet Nam could garner a share of the international market.

108. The area under flower production in Viet Nam covers less than 10 000 hectares. The major production areas are concentrated around big cities like Hanoi, Ho Chi Minh City, Hai Phong and Dalat. They account for three-fourths of the total area under flower production. Rose and chrysanthemum are the major flowers grown in the country, occupying 60 percent of the production area. Gladiolus and orchids are the other major flowers. The tropical climate in the South and the subtropical climate in the North, with pockets of temperate climate, permit production of a range of flowers.
109. There is no established system for making available quality planting material in sufficient quantities, either in the public or private sector. Traditionally, the farmers have access to new material through exchanges among themselves. Recently, there have been serious and organized efforts at establishing micropropagation units in several parts of the country, mainly in the private sector, and this is likely to improve the availability of material.
110. Production systems in Viet Nam have not been developed well. Most production is practiced in open fields. Simple shade houses are used for the production of gerbera, anthurium, carnation and lily. Small plastic greenhouses are being built, particularly in the South, for orchid production. But because of high investments, the spread is slow. Irrigation is provided by both overhead and surface methods. Small farm size leads to intensive cultivation. Most farmers renew the top layer of soil every few years. This keeps the build up of soil-borne pathogens in check.
111. Appropriate research support in terms of recommending suitable varieties and packages of practices for different agroclimatic conditions for major crops and for addressing specific problems related to production, plant protection etc. is provided by public research institutes and private companies and is being strengthened. Research is also underway for developing new varieties and recommending varieties for production after due characterization and evaluation.
112. There is no systematic post-harvest handling of the produce. In most instances, the middlemen or the buyers pick up the produce from the farm for supply to the markets, thus reducing the responsibility and thereby the concern of the growers for any post-harvest handling. No grading based on quality is practiced. For short distances, flower bundles are wrapped with newspapers or poly sheets, whereas for distant markets or for exports, flowers are packed in cartons. Overpacking is common and compromises the quality. As the major use of flowers is around special days like New Year (Tet Holiday), Teacher's Day, etc. the quality of flowers particularly vase life, is of little concern.

113. The marketing of cut flowers at present is highly unorganized. The development of marketing infrastructure, as well as market intelligence, is weak. The majority of producers being small, follow the conventional channel of producers to buyer/agent to market. Most of the production is undertaken for local markets. Earlier, some production was being exported to Russia and East Europe. Now small amounts are being exported to Europe, China and Thailand.
114. Skill development opportunities for floriculture workers are limited. The unskilled farm labour working in cut flower production farms generally consists of family labour and those engaged from nearby villages. At most farms, as well as markets, more than 70 percent of the persons engaged are women. The country lacks trained manpower for commercial floriculture. The technical manpower available lacks commercial orientation and has little exposure to hi-tech production for international markets but is capable of delivering good results.
115. Ms Kim emphasized the potential for floriculture development in the country because of the diverse agroclimates permitting year-round production of major cut flower crops, and because of the positive developmental initiatives of the government.

VI. RECOMMENDATIONS

116. Because of its capacity for income generation and employment generation, particularly for rural women, leading to poverty reduction, floriculture should be recognized as a priority area for development in the agriculture policies of the member countries.
117. All participating member countries, with the support of the local FAO Office, should conduct a survey on the current status of floriculture development, to enable planning of appropriate development programmes/projects. Once the information about the individual country is available, FAO may consider compiling a benchmark document on Asian floriculture development, and also convene a meeting to discuss future plans for development.
118. A Web-based Asian floriculture network for effective information exchange/sharing should be established. The Flower Research Institute (FRI-YAAS), Yunnan, China has agreed in principle to coordinate this effort. FAO will send a request to FRI to prepare the details for the assignment and nominate a focal person. The network should be established within a period of six months. The presentations made at the present Expert Consultation and the recommendations emerging from the meeting, should be put on the network Web site.
119. An e-conference on floriculture development should be convened/conducted during 2010 to discuss various issues constraining the growth of the sector. FAO was requested to prepare the TOR for this conference and consider publishing the proceedings.
120. Considering the increased involvement of the private sector in floriculture development

in all the member countries, governments should take initiatives for further strengthening the support to the private sector under a public-private partnership (PPP) programme

121. The exchange of experts/technicians among member countries for effective technical support, under the South - South Cooperation programmes of FAO should be encouraged.
122. FAO should consider supporting a regional programme for capacity building on harmonizing the plant quarantine regulatory framework in the member countries.
123. Recognizing the capital-intensive nature of the floriculture activity, the governments in the member countries should be guided on developing better access to developmental credit for their enterprises.
124. The governments of the member countries should be advised to encourage and support research programmes on emerging environment-friendly technologies such IPM, soilless culture, organic farming, etc. at their research centres. Funding of adaptive research of proven technologies from floriculturally advanced countries, should also be supported.
125. The Expert Consultation strongly suggested that an Asian floriculture training centre to strengthen the capacity building efforts for the development of the sector should be established. FAO may seek funding support for this.

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AGENDA

- a. Opening Session**
- b. Keynote Presentations**
- c. Country Reports**
- d. Recommendations**

PROGRAMME

Thursday, 7 January 2010

- 0800: Registration
- 0900: Opening Session
- Opening Address: Subash Dasgupta
Address: Dai Luyuan
Introduction of the Participants
Announcement of the Programme and Timetable
Photograph
- 1000: Tea Break
- 1030: Production Dynamics for Global Floriculture:
N.K.Dadlani, India
- 1100: The Competitive Edge for Asian Floriculture:
You Jie, China
- 1130: Open Discussion
- 1200: Lunch
- 1300: Presentation of floriculture development in participating countries
- 1700: General Discussions on Country Presentations
- 1800: End

Friday, 8 January 2010

- 0900: Open Discussions on the identification of gaps /
obstacles to potential development of floriculture in Asia
- Chair: Umed Pun, Nepal
- 1000: Open Discussions on possible solutions /
suggestions to fill up the identified gaps / obstacles

1100: Tea Break

1115: Drafting Programme Framework

 Chair: Subash Dasgupta
 N.K.Dadlani

1215: Presentation and adoption of recommendations

1315: Lunch

1400: Field Visit: Flower Research Institute (YAAS)

1800: End

Saturday, 9 January 2010

0800: Field Visit: Flower Market World Horticultural Expo Garden

1300: Lunch

1400: End of the Meeting



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