

Present Status and Prospects of Floriculture in Jammu and Kashmir



ICAR–Directorate of Floricultural Research, Pune

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भा.कृ.अनु.प.-पुष्पविज्ञान अनुसंधान निदेशालय

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FOREWORD



In recent times, floriculture has become increasingly popular not only as aesthetic value, but also as a commercial enterprise. After achieving self-sufficiency in the production of food grains following the green revolution in agriculture, growing of flowers has come in a big way. The improvement in the general level of well being in the country and increased affluence, particularly among the middle class, has led to transformation of the activity of flower growing into a burgeoning industry. India is bestowed with ideal temperature conditions from North to South and East to West for commercial floriculture throughout the year in some or other part. For production of higher number of quality flowers from per unit area for domestic and export markets there should be strong technological base to solve the day-to-day problems.

According to the estimates of National Horticultural Board, total area under flower crops in the country during 2013-14 was 255.02 thousand ha with production of 1754.49 and 542.53 metric tonnes of loose and cut flowers, respectively. Andhra Pradesh is the leading state in terms of acreage Tamil Nadu in the production of loose flowers whereas, Karnataka in production of cut flowers. The export basket of the Indian floricultural products comprises of dry flowers (77.1%), cut flowers (6.1%), bulbs and rhizomes (0.8%), cut foliage (0.02%) and others (15.9%).

Almost all of the cut flower crops cultivated by growers in Kashmir (as elsewhere in India) are imported and supplied by agents of foreign companies or their Indian subsidiaries. Some of the growers have fallen prey to dubious sources of plant material supply thus incurring heavy losses at the inception stage of their units. Most of the new planting material is untested in Kashmir conditions. Growers have little or no knowledge regarding the growth behaviour of the plant material they acquire. The cost of plant material forms a major chunk of input.

There is an urgent need to develop a publication on the performance of growth behaviour of major cut and loose flowers grown in Jammu and Kashmir. There is need to develop cultivation modules/technologies for popular varieties/cultivars under protected conditions. It can make recommendations so that cultivar choices at growers level are made on the basis of sound local data and not on a hit and trial basis.

In this context, this publication entitled "Present Status and Prospects of Floriculture in Jammu and Kashmir" highlights the present scenario of Floriculture in the state and future prospects and opportunities and will be of great use to those engaged in floriculture. I compliment the authors for their efforts in this regard.

(K. P. Singh)

April, 2015

Preface

Floriculture has emerged as an economically viable diversification option in the Indian agribusiness and has captured the interests of many new entrepreneurs into agricultural sector in recent times. Flower cultivation has been practiced in India since times immemorial but it is only in the recent years that floriculture has blossomed into a viable business sector. It was only in the last two three decades that floriculture got a boost due the adoption of new economic policy during 1991 in our country with the main objective of solving foreign currency crisis and removing the stagnancy through liberal economy. Later the Union Government provided incentives for the promotion of agriculture export through the certain policies and agencies including NHB, APEDA and NABARD. Today the area under floriculture has increased to more than 255 thousand ha with a production of 1754 and 542 MT of loose and cut flowers.

Jammu and Kashmir is the most colorful state in India and is located between 32°.17 and 37°.06 North latitude and 73°.26 and 80°.36 East longitude, falling in Western Himalayan region of the country. The terrain of the state is greatly dissected and has an average altitude between 500 to 3500 meter amsl with an annual rainfall of 1069 mm in subtropical Jammu, 660 mm in temperate valley and 80-90 mm in arid Ladakh region. Average temperatures also vary within the three regions of the state having 24.5, 13.3 and 5.3 °C in Jammu, Kashmir and Ladakh regions. Owing to its varied climatic condition the state of J&K is ideally poised to become the bulb hub of the country. The Department of Floriculture that previously was known a Department of Gardens and Parks entrusted with the upkeep of gardens and public recreational spaces underwent a radical revamp in 2007. The image of tulip garden of Kashmir has greatly helped to drive this craving for spring colour in gardens of subtropical and tropical India.

This document provides a roadmap for the growth and promotion of floriculture in Jammu and Kashmir. We wish to record our gratitude and thanks to Dr. N.K. Krishna Kumar, Hon'ble Deputy Director General (Horticultural Science), ICAR., New Delhi and Dr. K. P. Singh, Director, Directorate of Floricultural Research, Pune for their support and guidance in bringing out this document.

April, 2015

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I. Introduction

Floriculture has emerged as an economically viable diversification option in the Indian agribusiness and has captured the interests of many new entrepreneurs into agricultural sector in recent times. Flower cultivation has been practiced in India since times immemorial but it is only in the recent years that floriculture has blossomed into a viable business sector. A growing market as a result of improvement in the general level of well-being in the country and increased affluence, particularly among the middle class, has led to transformation of the activity of flower growing into a burgeoning industry. Availability of diverse agro-climatic conditions facilitates the production of all major flowers throughout the year in some or the other part of the country. With perception on floriculture business potential rapidly changing, the corporate have increasingly forayed into the sector. In recent decades there has been increasing demand of floriculture products with increasing income. It is a souring industry in Asian countries including India with ever increasing area. Although India has inherited floriculture from ancient past, yet the social and economic aspect of flower growing were recognized was later. It was only in the last two three decades that floriculture got a boost due the adoption of new economic policy during 1991 in our country with the main objective of solving foreign currency crisis and removing the stagnancy through liberal economy. Later the Union Government provided incentives for the promotion of agriculture export through the certain policies and agencies including NHB, APEDA and NABARD. Today the area under floriculture has increased to more than 255 thousand ha with a production of 1754 and 542 MT of loose and cut flowers.

The state of Jammu and Kashmir though having great potential for commercialization of floriculture and to its diversity of climate has still not received the focus commensurate with its potential. However, due to the effects of SKUAST-K and the Government of J&K, the area under floriculture in the state has increased to 0.75 thousand ha with a production of 0.42 thousand MT of loose flower and 1.82 thousand MT of cut flower.

II. Floriculture- at a Glance

Consumption and demand of flowers is rising world over with about 140 countries growing flowers for different purposes. Although European countries have developed their floral business very early but they could not produce enough quantity. New production centres have been emerging in Asian countries including India. Even though, Latin America and African countries have also increasing their production of flowers.

Iia. World Scenario

Cultivation and consumption of flowers have been part of tradition the world over. Netherlands, Italy, Germany and Japan have strong tradition of growing and consuming flowers. The expansion in area and production of flowers in non-traditional regions has been one of the noticeable features. Recently, new production centres are developing in Latin America, Africa and Asia to meet the increasing demand of flowers and to expand their domestic market. Columbia, Costa Rica Chile, Kenya, Rhodesia, Morocco, South Africa, Israel, India, China and Srilanka are one of the new floriculture centres. The floriculture market is concentrated in Western Europe, North America and Japan. Western Europe accounts for half of the world's cut flower production and consumption. The new markets emerging in Europe are Poland, Hungary, Slovakia and Ireland. In terms of area, India and China (2290550 ha) are the leading countries, followed by



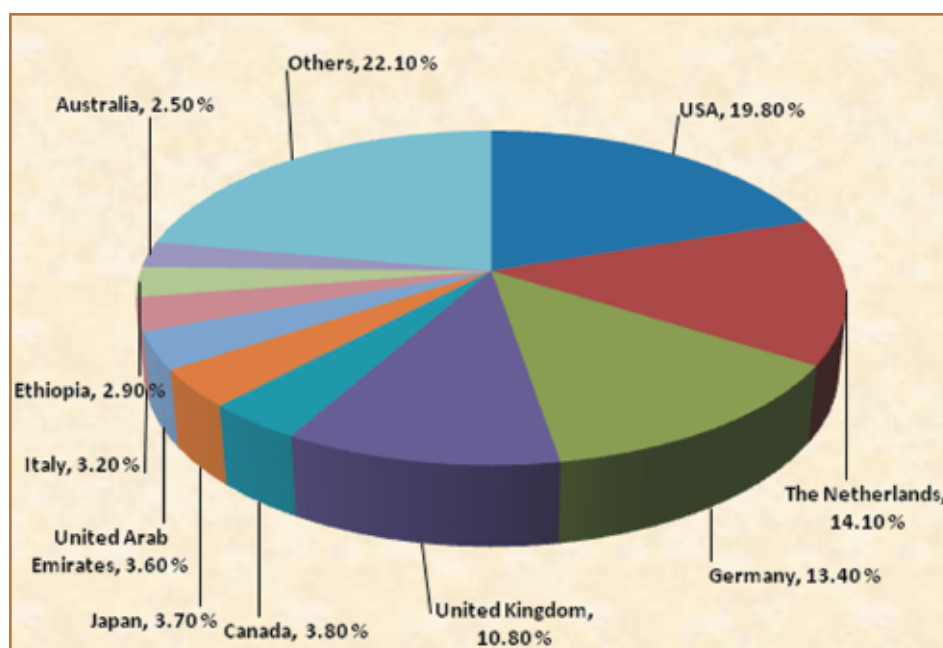
USA (25290 ha), Japan (21218 ha), Mexico (21129 ha), Brazil (10285 ha) and the Netherlands (8479 ha). With regard to export of floricultural products, the Netherlands ranks first (Rs 8894 lacs) followed by Germany (Rs 1287 lacs), Columbia (Rs 1107 lacs), Italy (Rs 741 lacs), Equador (Rs 735 lacs), Kenya (Rs 697 lacs), Belgium (Rs 592 lacs), Denmark (Rs 478 lacs), USA (Rs 366 lacs) and China (Rs 323 lacs). The largest importer of floriculture products include Germany (Rs 1787 lacs) followed by USA (Rs 1787 lacs), the Netherlands (Rs 1778 lacs), United Kingdom (Rs 1674 lacs), France (Rs 1381 lacs), Russia (Rs919 lacs), Nigeria (Rs 834 lacs), Belgium (Rs736lacs), Italy (Rs695lacs) and Japan (Rs666lacs) (Source: UNCOMTRADE, 2012-13).

The International floriculture trade is comprised of cut flowers, cut foliage, dry flowers, ornamental bulbous plants and potted plants. As per the estimates available from VBN (The Dutch Flower Auctions Association), Flora Holland and CBS (Central Agency for Statistics, the Netherlands), the percentage turnover of main cut flowers at the Dutch Auction Market include rose (23%), spray chrysanthemums (17%), tulips (14%), liliium (9%), gerbera (8%), standard chrysanthemums (4%), cymbidium (4%), freesia (3%), eustoma (3%), amaryllis (2%), anthurium, alstromeria and paeonia (2% each), cala lily, helianthus, gladiolus and carnation (1% each), whereas the trade in case of pot plants in terms of percent turnover is dominated by phalaenopsis (49%) followed by anthurium (8%), kalanchoe (7%), rose (6%), dracaena, other orchids, ficus, chrysanthemum (5%) and hyacinth (4%) (VBN, 2010).

Table 1. Top export destinations of floricultural products from India (2012-13)

S. No.	Country of destination	Quantity (MT)	Value (RsLacs)
1.	USA	6706.84	8380.99
2.	The Netherlands	3099.15	5970.00
3.	Germany	3715.28	5675.42
4.	United Kingdom	3191.89	4568.17
5.	Canada	985.89	1618.64
6.	Japan	801.35	1567.19
7.	United Arab Emirates	1029.36	1544.53
8.	Italy	820.80	1350.13
9.	Ethiopia	162.65	1232.07
10.	Australia	353.16	1073.82

(Source: APEDA)



(Source: NHB)

Chart 1: Commodity wise share of export of flowers from India (2012-13)

Iib. National Scenario

Area and production of flower crops

According to the estimates of NHB, total area under flower crops in the country during 2013-14 was 255.02 thousand ha with production of 1754.49 and 542.53 metric tonnes of loose and cut flowers, respectively. Andhra Pradesh is the leading state in terms of acreage Tamil Nadu in the production of loose flowers whereas, Karnataka in production of cut flowers.

Table 2. Area and production of floriculture in different States/ Union Territory of India

State/UTs	Area (000 ha)	Production (000 MT)	
		Loose Flower	Cut Flower
Andaman & Nicobar	0.13	0.29	0.00
Andhra Pradesh	20.37	136.27	30.00
Arunachal Pradesh	0.02	0.01	1.86
Assam	3.00	20.00	32.69
Bihar	0.82	7.63	2.74

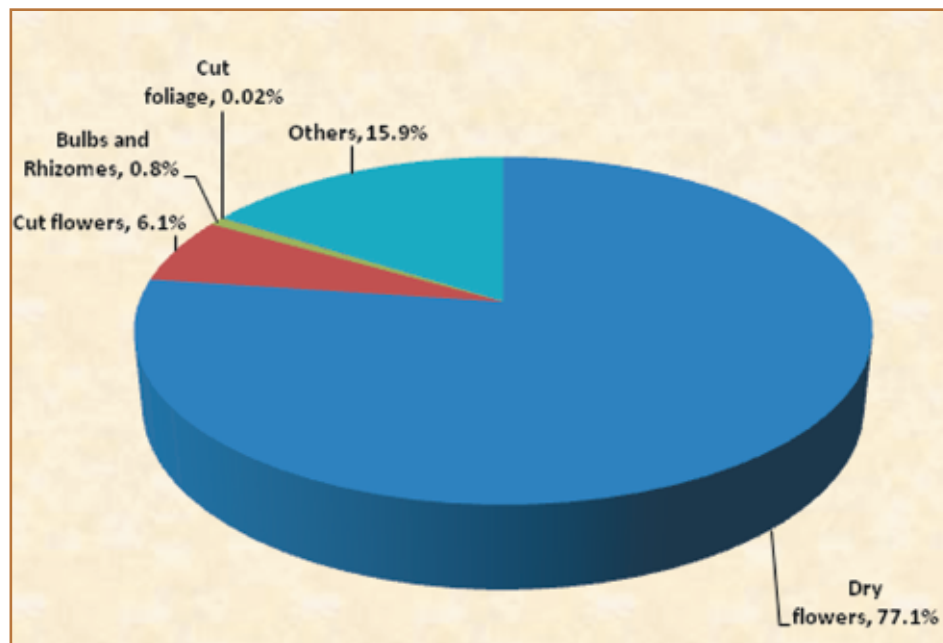
**Table 2.** Area and production of floriculture in different States/ Union Territory of India (Contd....)

State/UTs	Area (000 ha)	Production (000 MT)	
		Loose Flower	Cut Flower
Chhattisgarh	10.13	45.73	0.00
D & N Haveli	0.00	0.00	0.00
Daman & Diu	0.00	0.00	0.00
Delhi	5.50	5.70	5.77
Goa	0.01	0.02	0.10
Gujarat	17.30	163.60	0.00
Haryana	6.48	65.45	11.26
Himachal Pradesh	0.82	28.14	12.36
Jammu & Kashmir	0.75	0.42	1.82
Jharkhand	1.60	22.03	9.51
Karnataka	30.60	211.50	71.53
Kerala	0.00	0.00	0.00
Lakshadweep	0.00	0.00	0.00
Madhya Pradesh	17.06	200.39	0.00
Maharashtra	23.00	122.65	43.97
Manipur	0.76	0.28	0.01
Meghalaya	0.05	0.00	2.37
Mizoram	0.20	171.57	1.23
Nagaland	0.01	0.00	0.36
Odisha	7.44	37.40	57.40
Puducherry	0.14	1.20	0.00
Punjab	1.35	10.46	0.00
Rajasthan	2.53	2.73	0.00
Sikkim	0.24	16.00	1.88

Table 2. Area and production of floriculture in different States/ Union Territory of India (Contd....)

State/UTs	Area (000 ha)	Production (000 MT)	
		Loose Flower	Cut Flower
TamilNadu	55.03	343.65	12.87
Telangana	6.89	40.68	35.11
Tripura	0.00	0.00	0.00
Uttar Pradesh	16.58	32.16	54.06
Uttarakhand	1.35	2.02	8.45
West Bengal	24.85	66.50	145.19
Total	255.02	1754.49	542.53

The export basket of the Indian floricultural products comprises of dry flowers (77.1%), cut flowers (6.1%), bulbs and rhizomes (0.8%), cut foliage (0.02%) and others (15.9%).

**Chart 2:** Component wise export of floricultural products from India



III. Incentives for commercialization of floriculture

The union government has recognized floriculture as a thrust area for export and announced several concessions/ incentives for its development in the country. Main features of government incentives and schemes as listed below:

- Zero import duty in seeds, bulbs, cut on import duties for machinery, flower, and tissue culture seed on OGL
- 50% domestic sales allowed for EOU's
- Simplification of plan quarantine procedure and airfreight subsidiary.

The Ministry of Commerce, Government of India has identified four states, viz. Kerala for orchids, Maharashtra for carnation and roses, Karnataka for chrysanthemums, and Andhra Pradesh for roses for organized flower production.

The National Horticulture Board (NHB), Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India have two major schemes: soft loan up to a maximum limit of Rs 1crore advance for setting up infrastructural facilities like cold storage, pre-cooling units, packing and grading sheds, refrigerated transport, etc and loan facilities for the integrated projects involving production and disposal of floricultural products.

In order to increase production and enhance the quality of cut flowers, a central sector scheme with an outlay of Rs.1 crore during Eighth Five Year Plan and Rs 2.17 crore for 1993-94 remained operative during the year. The concept of the scheme was to introduce improved varieties of flowers of commercial importance, to intensify production of planting material, to introduce modern system of post harvest handling and to impart training to farmers and field staff. Nine model centres with tissue culture facilities were set-up in public sector in various states of India.

The Government provided Rs.10 crore scheme for commercial floriculture during 8th Five year plan involving the settings up of model centers, both in the public and private sectors, opening up 38 tissue culture, and expansion of areas under commercial floriculture by 2000. It proposed to establish model floriculture centre in the public sector, one each at Mohali, Calcutta, Lucknow, Bengaluru, Pune, Srinagar, Trivandrum, Gangtok and Chennai. Eight such centers had to be set-up in the private sector, one each at all the above places except Srinagar. Setting up of wholesale market cum auction centre's for trading in flowers were planned at Delhi, Bengaluru, and Mumbai, in association with one of the agencies of the concerned State Governments. The Government of India contributed 50 per cent of the cost and concerned State Governments had to meet the remaining 50 per cent. The Agricultural and Processed Food Products Export Development Authority (APEDA), Ministry of Commerce and Industry, Government of India has several schemes to support export activity with the aim of a) development of infrastructure and services. b) development of post harvest infrastructure c) packaging development and export promotion and d) market development.

During Ninth Plan, various centrally sponsored schemes were implemented to overcome constraints and improve productivity of the crops. These were related to the integrated development of fruit, vegetable and commercial floriculture and separate scheme for horticulture development through plasticulture intervention implemented during the Ninth Plan. It was aimed at the promotion of protected cultivation

through green house technology. A central sector scheme for development for harvest management and commercial horticulture is also in operation through NHB.

IIIa. National Horticulture Mission

The centrally sponsored scheme of National Horticulture Mission (NHM), was launched during 2005-06. It has continued the development of the horticulture sector in India, with an outlay of Rs 1000.00 crores. Eighteen states and two UT were covered under the National Horticulture Mission (NHM) during the year. The thrust of the NHM is on an area based regionally differentiated cluster approach for the development of horticulture crops, having comparative advantage. In all 259 districts have been taken up under the cluster approach and this includes 32 new districts added during 2006-07. Further, some components of the NHM are being implemented through various national level agencies such as the National Committee on Plasticulture Applications in Horticulture (NCPAH), which co-ordinates and monitors activities relating to precision farming and hi tech horticulture.

For the development of horticulture, duly ensuring an end-to-end approach having forward linkages covering research, production, post harvest management, processing and marketing. The focus areas of the mission are as under.

- Capacity building for production and supply of adequate quality planting material.
- Increased coverage of crops under improved/yielding cultivars.
- Enhanced production and productivity of horticulture crops.
- Strengthening of infrastructure facilities such as soil and leaf analysis labs, survey and surveillance of pests and diseases, green house, micro irrigation, plant health clinics, vermicompost, etc.
- Building adequate infrastructure for in farm and post harvest handling.
- Strengthening infrastructure facilities for marketing and export.
- Enhanced production of high value and low volume horticulture products for exports.
- Enhanced production of high value processed products.
- Building a strong base to enhance efficiency in adoption of technologies.

IIIb. Indian Floriculture Mission 2010

The Indian Floriculture Mission 2010 had the following objectives:

- An annual target of the one billion Dollars (Approximately Rs. 5000cr) of floriculture export by the year 2010.
- Quality and standard of floriculture produce with enhanced sell life must be maintained with active participation from research institutions and Bureau of Indian Standards.
- Infrastructure development including roads, uninterrupted electricity, water, cold storage, facilities of airport and training of customs officials for faster and careful clearances for floriculture units.



- Development of better and high yielding varieties of flowers and ornamental plants for domestic market.
- Pest management through indigenous research and knowledge.
- Establishment of Special Floriculture Zones(SFZ) in various part of the country to provide economical as well as technical support to farmers.
- Floriculture business must be under insured from production to market.

IIIc. The Role of Supporting Agencies

It is inappropriate to discuss floriculture development without knowing the role of supporting agencies such as NHB, APEDA and NABARD. National Horticulture Board has given support through various programmes to development horticulture including fruits, flowers and vegetables. APEDA nurtured the floriculture industry by various strategic measures. NABARD provides refinance facilities to banks and financial institutions i.e. State Co-operative Banks, Commercial Banks, and State Agricultural Development Finance.

IIIc1. National Horticulture Board and Floriculture Development

The NHB has considered two-pronged strategy; one of them is promotional activities to give boost to the process of employment generation, increase in income of small and marginal farmers and backward communities in the horticulture development process. Then second one include the catalytic activities for commercialization of horticulture through production, post harvest management and processing with enhanced productivity, processing and marketing related programmes.

Although the fund allocation to NHB was only about Rs.15 crore. However, a major thrust was given to NHB programmes in the Eighth Plan (1992-93 to 1996-97) and allocation was raised to 200 crore from 1985-86 to 1991-92 with the following features:

- Soft loan schemes for exploring commercial horticulture, post harvest management and marketing.
- Schemes to provide support services like market information and transfer of technology.
- Schemes to create awareness and updating the state of horticulture through innovative ideas and professional concepts.

The schemes during Ninth Plan have been made broad based to accommodate every aspect of horticulture promotion in the country. The schemes were made result oriented and substituted with back ended capital-intensive subsidy. The NHB has decentralized and simplified the procedures and subsidy linked with performance. The schemes has two components.

A) Production related components

- High quality commercial horticulture crops.
- Indigenous crops, herbs, aromatic plants, seed and nursery.

- Biotechnology, tissue culture, bio- pesticides, organic foods.
- Establishment of horticulture Health Clinic/ laboratory (for agri/horti unemployed graduates).
- Consultancy services, bee keeping.

B) Post harvest management/primary processing related components

- Grading/ washing/ sorting/ drying/ packing centres.
- Pre cooling unit/ cool stores.
- Refer van/ containers.
- Special transport vehicle.
- Retail outlets, auction platforms, market yard, rope ways.
- Ripening/ curing chamber.
- Radiation unit/ dehydration unit/ vapour heat treatment unit.
- Hort. Ancillary Industry e.g. tools, equipment, plastics, packaging, etc.

IIIc2. APEDA and Floriculture Development

The Agricultural and Processed Food Products Export Development Authority (APEDA) was established by the Government of India under the Ministry of Commerce on February 13, 1986 under the Agricultural and Processed Food Products Export Authority Act, 1985. The main responsibility of APEDA is the export promotion of processed horticultural products.

APEDA had conducted the study on viability of floriculture industry. The study identified several constraints including high marketing cost, absence of critical infrastructure for export facilitation, high cost of finance etc.,

IIIc3. NABARD and Floriculture Development

The National Bank for Agriculture and Rural Development was set- up on 1 July, 1982 under an act of Parliament by merging the Agriculture Credit Department and Rural Planning and Credit Cell of Reserve Bank of India and the entire undertaking of Agriculture Refinance and Development Corporation (ARDC). NABARD is an apex development bank of the country for supporting and promoting agriculture and rural development. The Government of India and Reserve Bank of India contribute the share capital of NABARD. NABARD operates through its head office at Mumbai, 28 regional offices situated in state capitals, a sub office at Port Blair and 320-district offices. A credit function of NABARD to floriculture is important as regard to development roles. Its mission to promote sustainable and equitable agriculture and rural prosperity through effective credit support. As a refinance institution, NABARD has been playing important role to develop floriculture industry.

Credit Function of NABARD

- Preparation of potential linked credit plans annually for all districts for identification of potential for exploitation through bank credit.



- Monitoring the flow of ground level rural credit.
- Issuing policy and operational guidelines to rural financing institution.
- Providing credit facilities to institutions.

IV. Challenges before the Indian floriculture industry

India's share in world floriculture trade has been negligible compared to some other countries because of the following reasons

- Availability of dedicated cool chain facilities from farm to airports are very low, airlines too prefer less volume cargo making things more difficult for exporters.
- Size of farms in India is quite small as compared to some countries thereby there is no economies of scale.
- Most of farmers depend on seeds imported from other countries for which they pay high royalty this increases cost of planting material.
- One of the major issue is the environmental cost, use of chemicals in cultivation which affect the final output and health of workers.

V. Suggestions for improving fortunes of Indian floriculture industry

Following measures can be undertaken to improve the reach and appeal of Indian floriculturist.

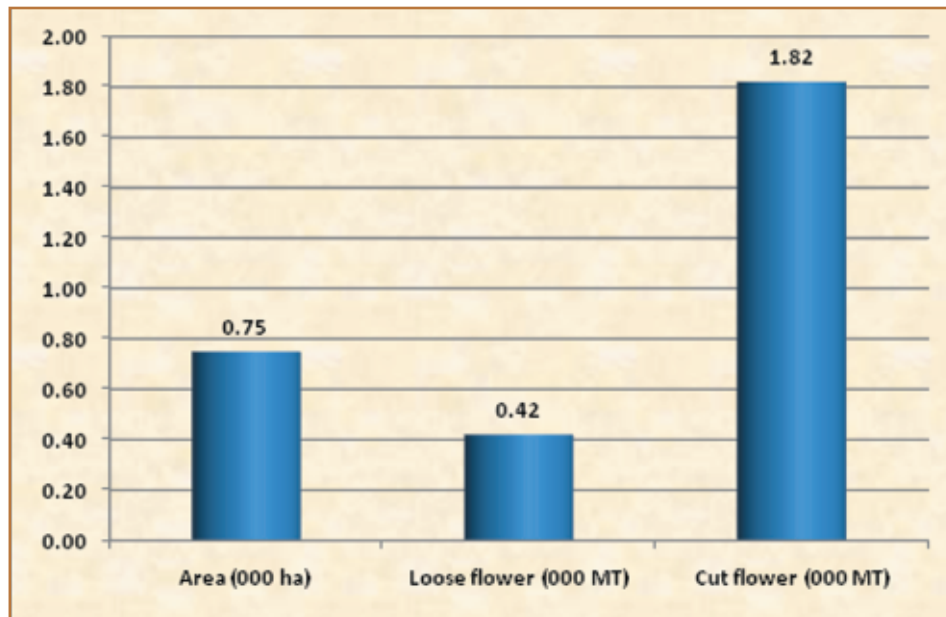
- Improvement in infrastructure facilities for transport of flowers for export market including increase in cold storage facilities for preserving flowers.
- Workshops on floricultural skills, introduction of new cultivation techniques, a strategic alliance with tourism industries.
- Promotion of floricultural products by local and national governments with targeted marketing to new customers (e.g. government departments, hotels, tourists).
- Postharvest production, information and management.
- Genetic improvement of cut flower varieties.
- Research priorities at floriculture research institutions throughout Asia could be directed towards developing innovative solutions which support global sustainability.
- In addition to above measures, unifying the image of flowers produced in Asia to create an identity of Asian floriculture would be a bold step. This could be implemented by introducing an Asian calendar of floral holidays which would indicate particular flowers and how they are used in association with these holidays. For example, in China, on a certain day in the autumn, the moon and all things associated to be round like the moon are appreciated. Millions of round cakes, labeled "moon cakes" are sold to consumers. This could be a commercial opportunity for

the Asian flower? In Vietnam, flower consumption is auspicious on the 1st and 15th of the month in compliance with Vietnamese traditions. This seems like another convenient way for the Asian flower industry to boost cut flower consumption all over the world twice a month if there were an Asian calendar of floral holidays reminding consumers that it was that time of the month to buy flowers.

VI. Floriculture Scenario: Jammu and Kashmir

Jammu and Kashmir is the most colorful state in India and is located between 32°.17 and 37°.06 North latitude and 73°.26 and 80°.36 East longitude, falling in Western Himalayan region of the country. The terrain of the state is greatly dissected and has an average altitude between 500 to 3500 meter amsl with an annual rainfall of 1069 mm in subtropical Jammu, 660 mm in temperate valley and 80-90 mm in arid Ladakh region. Average temperatures also vary within the three regions of the state having 24.5, 13.3 and 5.3 °C in Jammu, Kashmir and Ladakh regions.

The area and production of loose and cut flowers in the state of J&K during 2013-14 is given in the following chart:



(Source: NHB)

Chart 3: Area and production of flowers in J&K (2013-14)

The state is endowed with ample natural resources including soil, water, diversity in topography, climatic conditions, rich natural flora facilitating the cultivation of a wide range of flowers.

The state has had a historical garden tradition and has undergone many changes through the ages, mainly influenced by different cultures, religions, king and rulers during various historical periods. During the 16th and 17th centuries the concept of development of a garden in an enclosed space was introduced by

Mughal kings, Queens and Courtiers who laid out various gardens in northern India including Kashmir on the patterns of gardens in Iran and Central Asia. During this period there were two significant developments in gardening. One was the creation of formal design of gardens and the other important contribution was the introduction of many exotic trees like Chinar and cypresses and flowers like irises, narcissus, lilies, tulips and many others. During the 18th and 19th centuries more emphasis on introduction of many exotic species

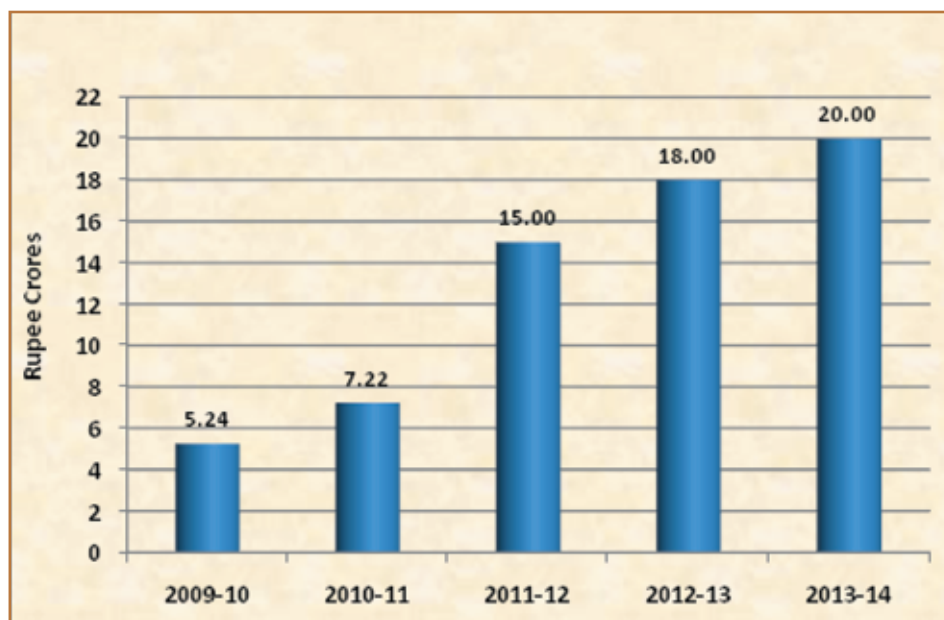


Chart 4: Turn over in flori-business in J&K

than the garden designs. A number of ornamental flowering trees, shrubs, climbers, annuals, biennials, herbaceous perennials, bulbous plants and others were introduced into the state from England and other European countries, mainly by the Englishmen, civil servants and individual amateurs. During the post-independence period, the revival of the gardens and creation of new recreational sites received due impetus especially in view of tourist oriented economy of the state. As a consequence an independent department of Gardens, Parks and Floriculture was created by State Government in 1969 to look after the garden activity in the state.

There are some factors which contribute to commercial floriculture to be potentially successful in Jammu and Kashmir State which include the following:

1. Spectrum of climate.
2. Flower seed and bulb production.
3. Dry flower and plant products.
4. Landscape plants.
5. Industrial production of floral concretes.

Components of Flori-business in J&K

1. Landscape plants/nursery/pot plants
2. Cut flowers
3. Bulbs
4. Flower seeds
5. Turfing
6. Aromatic plant productions

Ancillary Sector

- Green house and protected cultivation structures
- Chemicals
- Pesticides
- Fertilizers
- Fertigation
- Packaging materials
- Post harvest infrastructure
- Scientific equipments

1. Assistance provided by government under centrally sponsored schemes to growers

Government has propped the fledgling commercial flower production in J&K with the help of subsidies from centrally sponsored schemes like Horticulture Technology Mini Mission and RKVY. Department of Floriculture that previously was known a Department of Gardens and Parks entrusted with the upkeep of gardens and public recreational spaces underwent a radical revamp in 2007.

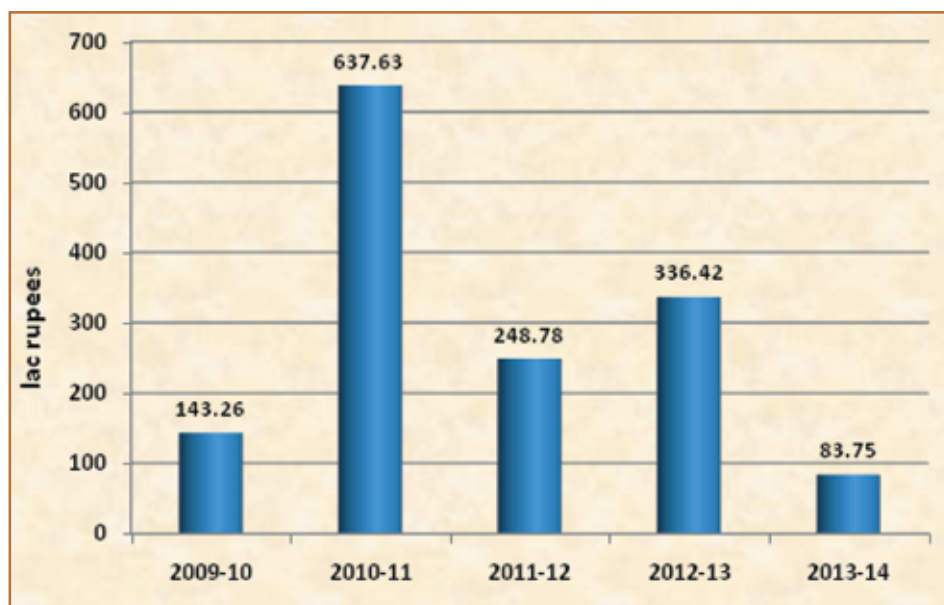


Chart 5: Availability of funds under RKVY in Floriculture (Kashmir Division)



Government was able to create a primary extension and development apparatus in the districts that was instrumental in kick-starting floriculture in different districts of J&K.

The area under commercial floriculture has witnessed a quantum jump during the last 6 years. Government has also created a significant marketside logistics/infrastructure in the form of cold storage facilities and refrigerated vans at district level. 15 walk-in-cold chambers at the cost of 182.00 lakhs have been established at various district headquarters in the Kashmir Valley and a provision of 9.00 lakhs has been kept for operational cost of these Walk-in Cold Rooms.

This has been further augmented by the creation of state of the art auction centre at centrally located Srinagar district.

At the end of the last five year plan, Government has put in place the requisite level of investment in infrastructure and logistics that need to be further built upon and strengthened in the current financial plan. There is a need to consolidate the gains made so far by investing in critical areas to make further sustainable long term growth.

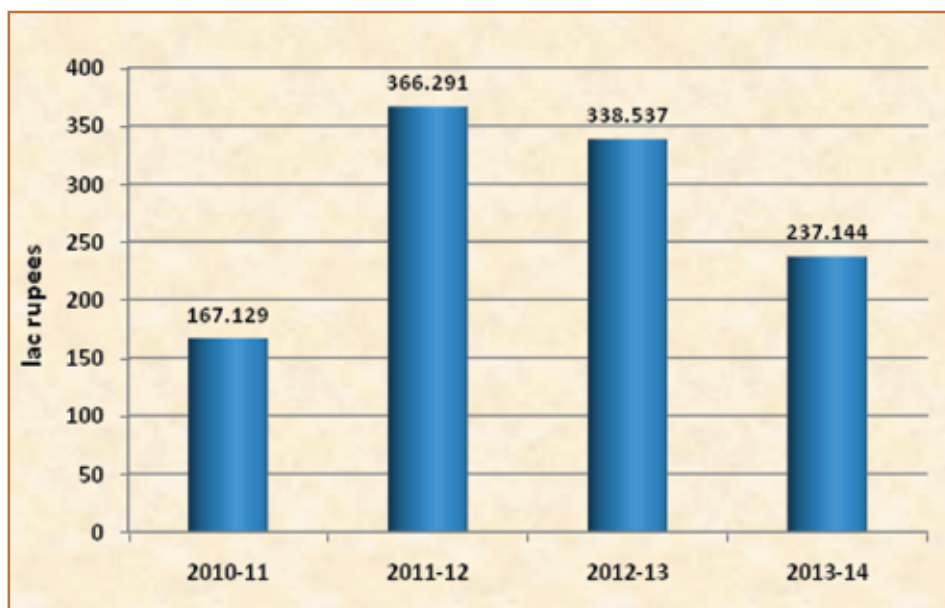


Chart 6: Availability of funds under Horticulture Mission for North East and Himalayan states (Kashmir Division)

Table 3. Guide lines for incentives under Technology Mission and RKVY

Particular	% age of Assistance	Rate of Assistance (Rs.)	Max. limit of Assistance
Area expansion	-	20500.00/ha	-
Small nursery	50	78125.00/kanal	1 ha
Aromatic plants (Cost intensive)	75	56250.00/ha	4 ha
Other Aromatic plants	75	18750.00/ha	4 ha
Cost of high value plant material for poly houses	50	250/Sq.mt	4000 Sq.mt
Creation of water resources (Pond, Tube well, Dug well)	75	1.03 lac/unit	1 Unit
Polyhouses (Fan Pad)	50	732.50/Sq.mt	4000 Sq.mt
Polyhouses (Fan Pad)	50	567.50/Sq.mt	4000 Sq.mt
Polyhouses (Fan Pad)	50	257.50/Sq.mt	4000 Sq.mt
Shade net house	50	300.50/Sq.mt	4000 Sq.mt
Shade net house wooden	50	2.5.50/Sq.mt	4000 Sq.mt
Training for Farmers			
Within District	100		400/day
Within State	100	-	450/day
Outside state	100	-	1000/day
Exposure Visit			
Within District	100	-	250/day
Within State	100	-	300/day
Outside state	100	-	600/day
Outside country	100	-	3 lacs



2. Scope of the Problem

Modern flori-business in India has in recent years morphed into a technology and knowledge driven activity. Success or failure in flori-business is not only the outcome of grower/entrepreneur skill at growing flower crops successfully in a high-tech environment but also on a number of extraneous factors like marketing and supply and demand over which a grower has no control. Floriculture has become a highly capital and technology intensive enterprise. Even a marginal farmer/grower has to shell out sizable cash/financial outlay to be able to set up an enterprise that runs sustainably. For achieving economies of scale a grower has to attain a critical level of input (investment) in terms of finances, technology, infrastructure etc. Most of the growers in J&K who have forayed into production of cut flowers do not qualify even as small level entrepreneurs. Almost all of the units are supported by government subsidy to the extent that about half to two-thirds of expenditure on poly green houses and planting material (95% of the incurred cost) is underwritten by Government support. In spite of this, the contribution in setting up of the unit that a grower has as margin money still presents a very daunting and significant financial challenge. This is more so as most of the entrepreneurs are self employed upstarts with little or no spare cash. There is always the risk of unit running sick or bankrupt in the first three years of operation because of little capacity to absorb setbacks in cultivation and marketing of the produce.

Subsidies on polyhouse infrastructure, plant material enables a new cut flower grower to make a start in the flori-business. However, to run the unit successfully a grower needs technological backstopping from the day one of the operations. While the government has invested heavily in terms of subsidy support to growers, very little attention has been paid to strengthen local intuitions that can provide the vital technical underpinning for sustaining the growth of flori-business in the long term. Virtually no evaluation of exotic elite cultivars of major cut flower crops/temperate bulb species has been conducted in Kashmir valley so far mainly due to lack of infrastructure in terms of high tech protected structures and cold storages with the university. There is dire need to put in place the necessary infrastructure in the university so as to enable it to fulfil the important role of well spring of home grown technological backstopping for floriculture sector.

Some of the key areas in the institutional support that need to be addressed to in the near term have been discussed below:

Via. Production of loose flowers

The major flowers for loose flower production in the state are marigold, rose, chrysanthemums, China aster and gomphrena. Cultivation of marigold has picked-up in the state as the demand for its flowers exists throughout the year. Many farmers, particularly small and marginal have started cultivating marigold as it provides income and employment to the family members. The popular variety grown in the state is 'Jaffri' with orange and yellow coloured medium sized flowers. The other African marigold varieties cultivated are Summer Sangaat, PusaNarangiGainga, PusaBasantiGaiinda and the local ones. The planting of seedlings is mostly done in last week of June for production of flowers targeting coming festivities of Navratras, Diwali, Dussehra and Gurupuras when higher market rates are realized. However, its cultivation is practiced throughout the year barring extremes of temperatures. The district breakup of marigold cultivation is given in table 4. Among loose flowers, maximum area is under marigold followed by rose, chrysanthemums, China aster and gomphrena.

VIIb. Production of cut flowers

The research work on cut flowers in the state was initiated with the introduction of varieties in various crops viz., rose, gladiolus, carnation, chrysanthemums etc. under the All India Co-ordinated Floriculture Improvement Project (ICAR) in the than Division of Olericulture and Floriculture SKUAST-K, Shalimar in 1987-88. As a consequence, commercial cut flower production got impetus with the adoption of gladiolus as a major crop for cultivation under open conditions in the state. The corms are planted from March to June and the spikes are produced from July to September. However, by planting of corms in late June and 2nd week of July, the spikes can be produced late in September and upto 2nd week of October i.e. during September and October when the demand is high. The Division has standardized production technology and recommended 32 varieties. Over production of spikes often leads to glut in market and to obviate this problem, technique for refrigeration at 4°C for 9-12 days when harvested at 5-6 florets showing colour is recommended. The farmers also cultivate gladiolus for production of high quality corms and supply the same to the adjoining states. According to the figures available with the Department of Horticulture, J&K, gladiolus crop covered an area of over 0.04 thousand ha during 2013-14.

Table 4: District wise area under floriculture in Jammu and Kashmir

Sl.No	District	Area (ha)
1.	Srinagar	46.04
2.	Ganderbal	17.28
3.	Budgam	41.43
4.	Anantnag	7.37
5.	Kulgam	2.21
6.	Pulwama	2.25
7.	Shopian	9.21
8.	Baramulla	0.5
9.	Bandipora	2.23
10.	Kupwara	12.05
11.	Jammu	90.36
12.	Samba	30.43
13.	Udhampur	23.31
14.	Reasi	54.40
15.	Kathua	65.28
16.	Doda	82.21
17.	Ramban	5.03
18.	Kisthwar	1.04
19.	Rajouri	1.07
20.	Poonch	0.27



Challenges

Almost all of the cut flower crops cultivated by growers in Kashmir (as elsewhere in India) are imported and supplied by agents of foreign companies or their Indian subsidiaries. Some of the growers have fallen prey to dubious sources of plant material supply thus incurring heavy losses at the inception stage of their units. Most of the new planting material is untested in Kashmir conditions. Growers have little or no knowledge regarding the growth behaviour of the plant material they acquire. They have little or no familiarity with the crops and face a stiff learning curve not only in the management of crop but also in running day to day operations like fertilization, irrigation, plant protection etc. Usually they are on their own regarding major decisions or depend upon the advice of plant material suppliers. The cost of plant material forms a major chunk of input. Most of the cultivars are bred for culture under protected conditions and have an exacting management demand for achieving maximum potential yield and quality. Any laxity or lapses in the management of crops in the initial establishment phase drastically reduces the profitability of the unit. There are many instances that have come to notice where growers not familiar with the crop suffered complete losses in the first year of operations itself. This has resulted in many units reporting sick, running at reduced capacities or even non functional.

Strategies to overcome challenges

There is a need to test cultivars of most of the cut-flower crops under protected conditions. SKUAST-K can act as a testing centre for new crops and cultivars. Growers depend upon agents/suppliers of plant material for their cultivar or crop choices. There is practically no data base available on the performance of elite cut flower cultivars under protected conditions in Kashmir. There is an urgent need to develop data base on the performance of growth behaviour of major cut flower crops in protected conditions so that growers are able to make crop/cultivar choice decisions on sound local data. There is a need to enhance and strengthen the infrastructure at SKUAST-K to conduct research on cut flower production under protected conditions. It can develop cultivation modules/technologies for popular varieties/cultivars under protected conditions. It can make recommendations so that cultivar choices at growers level are made on the basis of sound local data and not on a hit and trial basis.

Major activities

- Evaluation of cultivar performance of various cut flower crops like Carnation, Gerbera, Chrysanthemum, Alstroemeria, Liliium, Calla lily.
- Development of fertilization nodules for individual crops and cultivars
- Development of fertigation modules.
- Use the installed capacity as a training facility for growers entrepreneurs and field functionaries of the department.

Interventions

Evaluate new cultivars for recommendation to growers. Develop and standardize cultural practices, plant protection and post harvest modules for popularization of commercial cultivation of Gladiolus, Tulip, Liliium, Alstromeria, Rose, Daffodils, Chrysanthemum and Calla lily among the growers. Besides the above there are a number of other species like Dutch Iris, Zambac Iris, Asters, Snap dragons, Liatris, Freesia, Tuberose, etc that can be encouraged to increase product diversification in cut flowers. These minor species can help in attaining critical volumes to make dent in the highly competitive metro markets.

Table 5: Testing of genotypes of commercially important flower crops

Sl. No.	Crop	Genotype
1.	Gladiolus	Aarti, Aldabaran, Amsterdam, Apple Blossom, Big Time Supreme, Bindiya, BisBis, Bonus Memory, Buff Beauty, CPG-6, Eurovision, Fidelo, Friendship Pink, Her Majesty, Jackson Villa, Jackson Villa, Gold, Jester, Jester Gold, King Lear, Mayur, Melody, Mescagami, Moralla, Nazrana, Oscar, Peter Pears, Pink Jewel, Poonam, Powder, Puff, Princess Margaret-Rose, Priscilla, Psitachinus Hybrid, Punjab Selection, Purple King, PusaSuhagin, R.N.96, Rattna's Butterfly, Red Majesty, Regency, Rose and Wine, Rose Delight, Rose Supreme, Sanceree, Sapna, SKG-10, SKG-8, Spic and Span, Suchitra, Sunny, Boy, Sunset Jubilee, Sylvia, Top Brass, Traderhorn, Tropic Seas, Vink's Glory, Water Melon Pink, White Friendship, White Giant, White Goddess, White Prosperity, Wig's Sensation, Wind Song, Yellow Frills and Yellow stone
2.	Chrysanthemum	
	a) No pinch cultivars	C-1, C-3, C-4, C-5, C-6, C-8, C-10, C-11, C-166, C-167 and C-168
	b) Small flowered cultivars	C-9, C-13, C-14, C-15, C-16, C-17, C-18, C-19, C-20, C-21, C-26, C-40, C-41, C-42, C-44, C-45, C-50, C-51, C-52, C-53, C-54, C-55, C-57, C-58, C-59, C-60, C-62, C-63, C-64, C-65, C-67, C-69, C-74, C-76, C-80, C-81, C-82, C-84, C-87, C-89, C-94, C-97, C-104, C-109, C-114, C-115, C-116, C-117, C-118, C-121, C-122, C-125, C-126, C-131, C-132, C-136, C-143, C-146, C-147, C-150, C-151, C-152, C-153, C-155 and C-156
	c) Large flowered cultivars	C-12, C-23, C-25, C-27, C-28, C-29, C-30, C-34, C-36 and C-38
3.	Lilium	London, Merced, Novecento and Pollyanna
4.	Alstroemeria	Allahdin, No. 14, Pluto, Serina and Rina

Vlc. Bulb Production

Challenges

Owing to its varied climatic condition the state of J&K is ideally poised to become the bulb hub of the country. Garden lovers, landscape developers, resort owners, golf course managers in the subtropical plains of the country are looking at temperate bulbous flowers as an exotic choice to add dramatic and colourful effects to their properties. The image of tulip garden of Kashmir has greatly helped to drive this craving for spring colour in gardens of subtropical and tropical India. Every year growers in Kashmir Valley receive enquiries about supply of temperate bulbs like narcissus, daffodils, tulips, hyacinths, Anemones, Irises, Imperial lilies, Begonias etc. However, most of our bulb growers are marginal farmers who don't possess the wherewithal to sustainably maintain significant number/volume of ornamental bulbs not to speak of

varied cultivar base in different bulb species- an essential prerequisite to significantly cater to the growing demand. They are unable to supply the kind of huge orders they receive each year. More importantly growers are unable to maintain the purity of bulb stocks over time owing to primitive bulb production methods. There is a need to increase area under temperate bulb production in select districts. Bulb growers/agri-pruenuers who have the financial resources to start bulb production units on a large scale need to be encouraged not only with the subsidized finance but also by enabling import of varied cultivars from outside the country. Government has imported bulb cultivars from Holland before also but due to the lack of technological knowhow this germplasm base could not be maintained sustainably. Liliumbulb production at Model Floricultural Centre, Nunar is apoint in case where the purported objective of setting up export level liliumbulb production could not be achieved. Same is the case with the tulip garden also where to make good the dwindling tulip bulb volumes we are compelled to import fresh stocks from Holland each year. Instead of importing germplasm by Government agencies there is a need to again widen the cultivar/germplasm base available with the growers and providing them the specialized technological backup for sustainably maintaining their germplasm base. A fresh start can be made by subsidizing temperate bulb imports by private players. The technological backstopping can include centralized bulb processing, cleaning, grading and storage facilities. These facilities shall help in establishment of temperate bulb production on a fairly large scale in the state. There is a need to increase mechanization in bulb production by importing bulb planters and harvesters etc.



Bulb production in Lilium

Major activities

- Improve and broaden the germplasm base of temperate bulbs with the University.
- Evaluation of performance of important bulb genera like tulips, gladiolus, lilies, narcissus and daffodils, iris, alstroemeria etc.
- Standardize bulb production technology in important bulbous species that would form the base for quality planting material production in temperate bulbous ornamentals.
- Standardize post-harvest handling and storage of bulbs on a large scale.

VId. Protected cultivation of flowers

Protected cultivation which enables some control of wind velocity, moisture, temperature, mineral nutrients, light intensity and atmospheric composition has contributed and will contribute much to a better understanding of growth factor requirements and inputs for improving crop productivity in open fields. Devices or technologies for protection or structures may be used with or without heat. The intent is to grow crops where otherwise they could not survive by modifying the natural environment to prolong the harvest period, improve quality and make commodities available when there is no outdoor production. With promotional schemes of the National Horticulture Mission and National Horticulture Board, the cultivation of flowers under protected conditions has picked up in the state. The protected cultivation of flower crops in the state is gerbera, carnation, liliun and rose are major crops presently being cultivated under protected conditions. Under gerbera, the varieties grown under protected cultivation included Havana (yellow), Julia (red), Amlite (red), Rionibro (pink), Amelie (white) and Teresa (white). In case of rose, the varieties like Avalanche, Top Secret, Gold Strike and First Red are being cultivated in naturally ventilated polyhouses provided with foggers and drip irrigation system. Similarly, in case of liliun and carnation, red, white, yellow and orange coloured varieties are preferred. The success of protected cultivation lies in the management of polyhouse environment in the extreme climatic conditions of winter and summer through passive modification of the growing conditions.



Protected cultivation



Objectives and advantages

The overall objective of protected cultivation is to modify the natural environments by practices or structures to achieve optimal productivity of crops by enhancing yields, improving quality, extending the effective harvest period and expanding production area. There are also other specific objectives and advantages as:

- Protecting crops from drought.
- Reducing water requirement.
- Protecting crops in open field from frost and freezing.
- Reducing wind damage.
- Reducing the damage from insects, diseases, nematodes, weeds, birds and other predators.
- Extending production areas and growing season.
- Increasing crop yield, improving quality and conserving resources.
- Stabilizing the market for high quality products.
- Controlling atmospheric CO₂ level.

Vle. Nursery production

Consumer demand for nursery crops is driven by housing. Housing initiates the desire of homeowners to be surrounded by aesthetically pleasing environments. The number of hobby gardeners is ever increasing. Demographic experts cite three key demographic trends that show promise for horticultural industries.

- Landscape gardening as an enterprise has a brilliant future due to the emergence of Tourism and IT industry, which attracts a lot of foreign tourists and business personnel.
- More self-employment avenues are open due to flair in home gardening and indoor gardening. The flat culture spreading throughout urban India creates demand for indoor gardens, window sill gardens, bonsai, terrariums etc.
- There are agencies, which employ trained hands to periodically arrange flower vases and potted plants in offices and for functions, which is a lucrative business. Hence, the scope of this area is very wide spread in location.

Despite this optimistic outlook for the nursery industry, it's important to recognize that nursery products are luxury items and will experience reduced demand during periods of economic downturn. Industry insiders feel the nursery industry can ride through an economic downturn, as people will stay home and spend time in their gardens and buy plant material. As a consequence, a large number of nurseries have come up and scattered all over the state which are involved in the marketing of ornamental plants, flowers, bulbs, flower seeds etc. besides, these are also involved in the landscape development. Various nurseries in the state are engaged in the wholesale business of ornamental plants. Most of these nurseries import planting material from other states of the country.

Vlf. Marketing

The floriculture products marketed, include ornamental tree species, shrubs, climbers, palms, ferns, bulbous plants, roses, annuals, groundcovers, topiaries, turfgrasses, cut flowers, loose flowers, dry flowers, seeds, bulbs, essential oils, etc. The flower market in the state is highly unorganized. The flowers are sold locally without any predetermined and fixed rates. The prices are highly dependent on season. During the wedding seasons the product fetches premium prices. In the absence of any regulatory mechanism, the local vendors directly purchase the flowers from the farmers. The price control mechanism for the same is necessarily required. In the absence of regulated marketing of flowers, there are gluts in the market. Proper marketing intelligence is, therefore required to help the producers in timing the production during the periods of high demand in the market. As the number of green houses/poly houses are increasing the production of flowers is increasing in the state and so development of appropriate market infrastructure and cool chain facility are urgently required for marketing of flowers.

Important consideration during marketing of plants from nurseries

Following considerations should be taken into account before marketing of plants from nurseries:

Preparation of nursery plants before sale

All the plants propagated in nursery are made available for sale during the upcoming season when there is adequate demand for plants. A successful nurseryman makes various plants of improved variety available for the farmers. The plants in demand are prepared for sale during the ensuing season. These plants should be made available well in time. It is therefore important for the nursery entrepreneurs to make a thorough survey and study of demand and gap in supply of different nursery plants. The nursery entrepreneur should book the demand from various customers well in advance to market plants successfully during the next season. The demand survey regarding requirement of different plants is to be done in order to ascertain the place and time of demand and to get an idea of the existing rates of plants in other nurseries. Any lack of information on demand survey of nursery plants in the area can lead to difficulty in sale and may also cause poor recovery of payment for supplied plants. The cost of various nursery plants can be fixed depending on the age of plants, height of plants, variety, propagation technique used, production cost, maintenance costs etc.

Time of Sale of Nursery Plants

It is an important point to be considered before the plants are propagated and made available for sale. The sale of plants is required to be undertaken when there is adequate demand.

Publicity and advertisement for sale of nursery plants

There should be adequate publicity and advertisement of availability of various grafts, seedlings in the nursery. Such publicity and advertisement helps in sale and supply of plants at appropriate rates and time. Different strategies of publicity and advertisement can be adopted for sale of plants from the nursery which may include the following:

- Sales area
- Advance booking
- Information through Gramsabhas



- Exhibiting through Stall
- Advertizingthrough Newspaper and Magazine
- Publicity in Weekly Bazaars
- Posters and Blowups
- Appointing Sale Agents
- Information Brochures
- Printing Catalogue

Vlg. Aesthetic gardening and landscaping

The Jammu and Kashmir is an important tourist and religious destinations. Every year lakes of tourist from different parts of the country and world visit the state,particularly Kashmir valley. The aesthetic floriculture especially tulip garden and other heritage gardens(Mughal Gardens) and sky resorts attract tourist s to the Kashmir valley.

However aesthetic floriculture in landscaping and also subsequent development of Asia’s biggest tulip garden attracts tourist to Kashmir valley in every spring ,there by helps to prolong the tourist session and add more revenue to the GDP of J&K state.

VII. Role of SKUAST-K

To popularize flower cultivation among the growers and amateur and to disseminate the technologies, the department organizes exhibitions and flower Shows every year. Besides, it also organizes trainings on flower production and landscaping to Horticulture Development Officers, other staff of Horticulture and Agriculture Departments, farmers, amateurs and gardeners from time to time. The major component of research in the Department is supported by the AICRP on Floriculture, ICAR, New Delhi, which is an out-reach programme of Directorate of Floriculture Research. As a result, variousimproved varieties are of different crops are in pipe-line for their release at National level.

VIIa. Development of production, propagation, post harvest management and transferable technologies

a) Production technology

The complete Package of Practices for seed production of important flowering annuals have been developed by the university. The optimum time of transplanting, planting density, control of weeds and seed collection techniques have been standardized. The technology for cultivation of chrysanthemum, gladiolus, marigold, rose and foliage greens have also been standardized.



Field view of Narcissus



No Pinch No Stalk varieties of Chrysanthemum

b) Transferable technology developed

Various technologies developed under AICRP on Floriculture in different crops by SKUAST-Kashmir centre till date and their dissemination to the farmers field are as under:

1. Gladiolus

a) Post-harvest management

- **Wet storage:** In postharvest management of gladiolus cv. White Prosperity, with shorter duration of 0, 3, 6 and 9 days associated with tight bud stage of harvesting, the cut spikes proved best for maintaining the keeping quality of the flowers.
- **Dry refrigerated storage:** In dry refrigerated storage, cut gladiolus spikes cv. White Prosperity given pre-storage pulsing treatment with Sucrose 20% + $Al_2(SO_4)_3$ 300 ppm] and shorter storage levels of 0, 7 and 14 days, proved best in enhancing the vase life and maintaining the keeping quality than longer durations (21 and 28 days).
- **Varietal response to storage:** Gladiolus cvs. White Prosperity, Priscilla and Sanceree when tested in storage durations (0, 6, 12 and 18 days), and harvested at stage II (when 5-6 florets showed colour) proved best in shorter durations of 0, 6, and 12 days than longer one i.e. 18 days.

a) Production technology

- **Weed control:** Six weeds viz., *Sorghum halepenses*, *Amaranthus viridis*, *Chenopodium album*, *Cruidus pulvestries*, *Verbesium* and *Cynodon dactylon* were identified in farm of gladiolus field. Herbicides viz., Areizin, Metribuzin, Butachlor and Pendimethlin were used for controlling above weeds. Among these Pendimethalin used either @ 0.75 kg a.i./ha or 1.0 kg a.i /ha proved to be most effective controlling weeds. Metribuzin and Butachlor had detrimental effect on the crop, though exhibited little influence on weeds as on cooperative basis.

2. Lilium

a) Post-harvest management

- **Post-harvest management of Lilium:** Vase solution containing 2% sucrose + 200 ppm 8-HQC+200 ppm GA_3 was found promising for post harvest life of lilium.



3. Tulip

a) Post-harvest management

- **Pulsing/ holding trials:** In post harvest studies of cut tulips cv. Apeldoorn pulsing and holding solutions were standardized for improving the quality and longevity of the cut scapes. The best pulsing solution was Sucrose (4%)+ $Al_2(SO_4)_3$ 3-300 ppm followed by Sucrose (4%) + Silver thiosulphate 2mM and the best holding solution for keeping quality of cut tulips scapes was Sucrose (2%)+ STS 2mM followed by Sucrose (2%) + citric acid 300 pp

4. Daffodils

a) Post-harvest management

- **Pulsing/ holding trials:** Regarding the post-harvest technology of daffodils, pulsing and holding solutions were standardized for improving the keeping quality of daffodil cut Spathes cv. Tunis. In pulsing trial, the best treatment was STS 2mM followed by $Al_2(SO_4)_3$ 3-300 ppm alone or with Sucrose 4% in combination and in holding experiment two solutions *viz.*, STS 50 ppm and $Al_2(SO_4)_3$ (300 ppm) alone (without Sucrose 2% in combinations) proved best for enhancing the keeping quality of cut daffodil scapes. Sucrose 2% alone or in combination with any chemical didn't influence much in improving the quality of cut daffodils.

VIIb. Breeding and testing of new varieties

In its programme of enrichment and assessment of germplasm of six crops viz gladiolus, chrysanthemum, tulip, daffodils, liliium and alstroemeria at the AICRP on Floriculture centre, SKUAST-K, following varieties are recommended for commercial cultivation in region.

VIIb1. Gladiolus

- For cut flowers: Amesterdom, Apple Blossom, Big Time Supreme, Eurovision, Jascckson Villa Gold, Jester, Jester Gold, Mescagami, Moralla, Oscar, Peter Pears, Priscilla, Rattna'sButtterfly, Rose and Wine, Rose Delight, Rose Supreme, Sanceree, SKG-10, Sunset Jubilee, Traderhorn, Vink's Glory, Water Melon Pink, White Friendship, White Giant, White Goddess, White Prosperity, Wind Song, Yellow Stone.



White Giant

Days to sprout 33.20
Spike length (90.15cm)
No. of florets 16.10
Fluorite size (9cm)
No. of florets open at a time 3.33
No. of corms/plant 1.20
Vase life 8days



Yellow Stone

Days to sprout 34.10
Spike length 90.10(cm)
No. of florets 15.30
Fluorite size (8.10cm)
No. of florets open at a time 2.80
No. of corms/plant 1.40
Vase life 8 days



White Prosperity

Days to sprout 36.12
Spike length 92.10(cm)
No. of florets 17
Fluorite size (9cm)
No. of florets open at a time 4
No. of corms/plant 12.10
Vase life 9.10



Eurovision

Days to sprout 35.15
Spike length 87.30(cm)
No. of florets 15.80
Fluorite size (8.30cm)
No. of florets open at a time 3.33
No. of corms/plant 2.14
Vase life 8.20 days



Oscar

Days to sprout 32.20
Spike length 86.80(cm)
No. of florets 15.60
Fluorite size (7.30cm)
No. of florets open at a time 4.10
No. of corms/plant 2.16
Vase life 9 days



Punjab Selection

Days to sprout 33.70
Spike length (80.50cm)
No. of florets 14.30
Fluorite size (8cm)
No. of florets open at a time 3.14
No. of corm/plant 1.40
Vase life 7days

**Traderhorn**

Days to sprout 34.10
Spike length (90cm)
No. of florets 16.80
Fluorite size (8.50cm)
No. of florets open at a time 4
No. of corms/plant 2.15
Vase life 9days

**Moralla**

Days to sprout 31.16
Spike length 90.20(cm)
No. of florets 17
Fluorite size (8.20cm)
No. of florets open at a time
No. of corms/plant 2.16
Vase life 8.30

**Purple King**

Days to sprout 30.14
Spike length (85.60cm)
No. of florets 24.20
Fluorite size (8.10cm)
No. of florets open at a time 3.30
No. of corms/plant 2.16
Vase life 7.90 days

**Pusa Suhagin**

Days to sprout 35.20
Spike length (88.70cm)
No. of florets 16
Fluorite size (9cm)
No. of florets open at a time 3
No. of corms/plant 2.15
Vase life 8 days

**Regency**

Days to sprout 30.15
Spike length (90cm)
No. of florets 17
Fluorite size (9.10cm)
No. of florets open at a time 3.16
No. of corms/plant 2.10
Vase life 8.10

**Buff Beauty**

Days to sprout 35.10
Spike length (84.10cm)
No. of florets 15
Fluorite size 7.10(cm)
No. of florets open at a time 3
No. of corms/plant 2.20
Vase life 8.24

Following are the hybrids under gladiolus development for release and testing

Table 6: List of gladiolus hybrids under testing and release

S. No	Hybrids	S. No	Hybrids
1.	White Goddess x Rose Delight	11.	White Prosperity x Red Majesty
2.	White Prosperity x Her Majesty	12.	Priscilla x Big Time Supreme
3.	White Prosperity x Rose Supreme	13.	Priscilla x Her Majesty
4.	White Prosperity x Big Time Supreme	14.	Priscilla x Rose Delight
5.	White Prosperity x Apple Blossom	15.	Fidelo x Peter Pears
6.	White Prosperity x White Friendship	16.	Priscilla x Apple Blossom
7.	Priscilla x Princess Margaret Rose	17.	Fidelo x Big Time Supreme
8.	Friendship white x White prosperity	18.	Traderhorn x White Prosperity
9.	White Prosperity x Princess Margat Rose	19.	Amsterdam x Rose Delight
10.	White Prosperity x Peter Pears	20.	White Prosperity x Fidelo

Hybrids



Traderhorn x White Prosperity (SKG1)

Days to sprout 32.15
Spike length (90.10cm)
No. of florets 17.10
Fluorite size (9.cm)
No. of florets open at a time 3.12
No. of cormels/plant
Vase life 8.10



White Prosperity x Red Majesty (SKG2)

Days to sprout 30.
Spike length (90 10cm)
No. of florets 17.05
Fluorite size (9.10cm)
No. of florets open at a time 3
No. of cormels/plant
Vase life 9.10



Amsterdam x Rose Delight (SKG3)

Days to sprout 33.10
Spike length (89.10cm)
No. of florets 16.20
Fluorite size (9.10cm)
No. of florets open at a time 3.08
No. of corms/plant 2
Vase life 8.40

**Priscilla x Big Time Supreme (SKG4)**

Days to sprout 33.15
Spike length (980cm)
No. of florets 16.18
Fluorite size (9.m)
No. of florets open at a time 3.40
No. of corms/plant 2.30
Vase life 8.10

**White Prosperity x Rose Supreme (SKG5)**

Days to sprout 34.10
Spike length (92cm)
No. of florets 17.20
Fluorite size (9.50cm)
No. of florets open at a time 3.
No. of corms/plant 2.15
Vase life 8.10

**White Prosperity x Big Time Supreme (SKG6)**

Days to sprout 34.72
Spike length (90.10cm)
No. of florets 16.32
Fluorite size (8.10cm)
No. of florets open at a time 3.20
No. of corms/plant 2.20
Vase life 7.30

**Priscilla x Her Majesty (SKG7)**

Days to sprout 35.20
Spike length (88cm)
No. of florets 14.30
Fluorite size (9.12cm)
No. of florets open at a time 3.20
No. of corms/plant 2.10
Vase life 8.

**Priscilla x Rose Delight (SKG8)**

Days to sprout 35.15
Spike length (90cm)
No. of florets 14
Fluorite size (9.10cm)
No. of florets open at a time 3
No. of corms/plant 2.10
Vase life 8.20

**Fidelo x Peter Pears (SKG9)**

Days to sprout 35.10
Spike length (90.10cm)
No. of florets 15
Fluorite size 8.20(cm)
No. of florets open at a time 2.16
No. of corms/plant 2.40
Vase life 9.10



White Prosperity x Apple Blossom (SKG10)

Days to sprout 30.16
Spike length (84cm)
No. of florets
Fluorite size (cm)
No. of florets open at a time
No. of corms/plant 2.15
Vase life 8.30



White Prosperity x White Friendship (SKG11)

Days to sprout 34.16
Spike length (88cm)
No. of florets 16.12
Fluorite size (9.14cm)
No. of florets open at a time 3.30
No. of corms/plant 2.15
Vase life 8.40



Priscilla x Apple Blossom (SKG12)

Days to sprout 30.20
Spike length (90.10cm)
No. of florets 17.12
Fluorite size (9.cm)
No. of florets open at a time 3.14
No. of corms/plant 2.20
Vase life 8



Priscilla x Princess Margaret Rose (SKG13)

Days to sprout 37.10
Spike length (88.30cm)
No. of florets 14.40
Fluorite size (7.90cm)
No. of florets open at a time 2.90
No. of corms/plant 2.18
Vase life 8.12



Fidelo x Big Time Supreme (SKG14)

Days to sprout 34.14
Spike length (90cm)
No. of florets 16
Fluorite size (8.90cm)
No. of florets open at a time 3
No. of corms/plant 2
Vase life 8.30



Friendship white x White prosperity (SKG15)

Days to sprout 34.15
Spike length (90.20cm)
No. of florets 17.18
Fluorite size (9.10cm)
No. of florets open at a time 3.10
No. of corms/plant 2.10
Vase life 9.10

**White Goddess x Rose Delight (SKG16)**

Days to sprout 30.50
Spike length (89cm)
No. of florets 16.14
Fluorite size (9.10cm)
No. of florets open at a time 3
No. of corms/plant 2.16
Vase life 8.10

**White Prosperity x Fidelo (SKG17)**

Days to sprout 36.15
Spike length (86.15cm)
No. of florets 16
Fluorite size (9.10cm)
No. of florets open at a time
No. of corms/plant 2.16
Vase life 8.30

**White Prosperity x Her Majesty (SKG18)**

Days to sprout 33.18
Spike length (78.10cm)
No. of florets 14
Fluorite size (7cm)
No. of florets open at a time 3
No. of corms/plant 1.5
Vase life 6

**White Prosperity x Peter Pears (SKG19)**

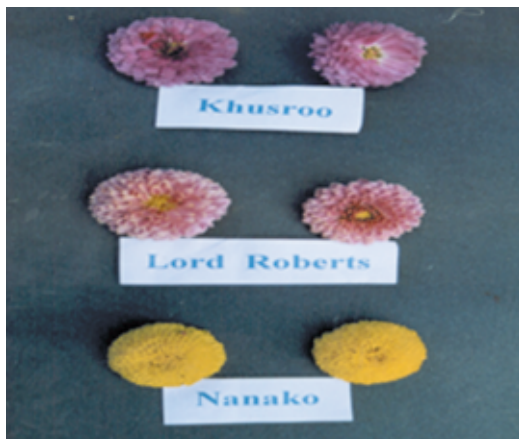
Days to sprout 36.15
Spike length (90cm)
No. of florets 17.22
Fluorite size (9cm)
No. of florets open at a time 3.20
No. of corms/plant 2.10
Vase life 8.

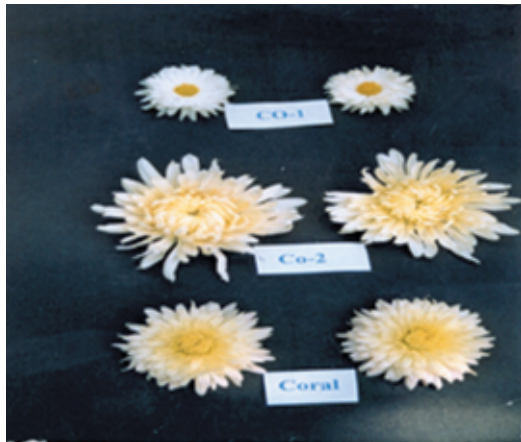
**White Prosperity x Princess Margat Rose (SKG20)**

Days to sprout 36.18
Spike length (80cm)
No. of florets 16
Fluorite size (8.10cm)
No. of florets open at a time 3
No. of corms/plant 2.20
Vase life 8.30

VIIb2. Chrysanthemum

- **For pot culture:** Arun Kumar, ArunSingar, HemantSingar, Local White, Panchoo, PeetSingar, SharadSingar, SwetaSingar.
- **For cut flower:** Alison, Apsara, Baggi, Basanti, Davidson, Donald, Flirt, Pink Cloud, Raja, Vinaya, C-25, C-38, C-68 and C-136 .
- **For Garland making:** Apsara, Aparajita, Kundon, Khusroo, Lilliput, Nanako, Phyllies, Vasantika, C-122, C-125, C-147 and C-156.
- **For garden decoration:** Aparajita, Bett, Dora, Fish Tail, Local yellow, Red Gold, White Quills, C-115, C-131 and C-136.





VIIb3. Tulip

- For cut flower: Abba, Apledoorn, Ballerian, Cassini, Golden Melody, Inzell Lucky Stricke, Parade and Purrisima.
- For garden decoration: Cassini, Beethoven's Memory, Cantala, and Golden Melody



Apledoorn



Golden Melody



Inzell



Cassini



VIIb4. Daffodils

- For cut flower :Vansion, Wrestler,N-23, White Well, Golden Pedestal N-26,N-31,N22 and Tunis
- For pot culture :Scilly White, N-25, N-30 and Texas



Tunis



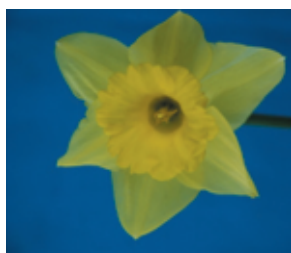
Vansion



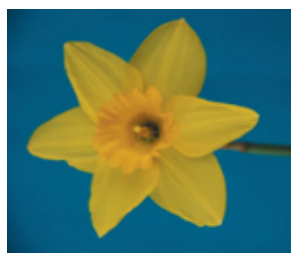
Golden Pedestal



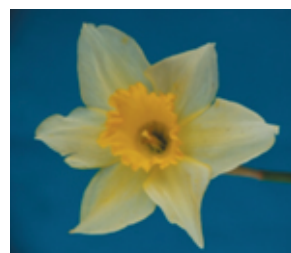
N-25



N-23



N-31



N-6



N-22

VIIb5. Liliium

- **For cut flower:** London, Merced Pollyanna, Royaltrinity, Monorca, Brindsi, Courier, Dream Land, Novocenta and Elite.



Brindsi



Royal trinity



Dreamland



Courier



Elite

VIIb6. Alstroemeria

- For cut flower: Aladdin and No. 14
- For pot culture: Pluto, Serina and Rina.



Aladdin



No. 14



Pluto



Rina

**All India Coordinated Research Project on Floriculture SKUAST (K),
Agricultural Research Station, Wadura Campus,
District Baramula, Jammu & Kashmir**

STAFF POSITION

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Asstt. Floriculturist	1	Dr. Z. A. Bhat	09419906993 zahoorflori2003@gmail.com
Mali	2	Mr. A. R. Wani Mr. M. A. Wani	

DIVISION OF FLORICULTURE AND LANDSCAPE ARCHITECTURE

The Division was instituted during 1988-89 and was a part of the Division of Olericulture and Floriculture. From April 1992 the Division started functioning independently under the nomenclature Floriculture, Medicinal & Aromatic Plants. Recently in 2014, the nomenclature of the Division was again changed as Division of Floriculture and Landscape Architecture. The Division provides teaching, research and extension education in Floriculture & Landscaping.

Professor and Head of the Division since inception

S. No.	Name	Period	
		From	To
1.	Prof. A. Q. Jhon	01.06.1994	30.04.2005
2.	Prof. M. A. A. Siddique	01.05.2005	03.08.2009
3.	Prof. T. M. Paul	04.08.2009	30.04.2010
4.	Prof. M. A. A. Siddique	01.05.2010	30.03.2013
5.	Prof. F. U. Khan	30.03.2013	Acting

Present Staff Position of the Division

S. No.	Name of Scientist	Designation	Email ID.	Mobile No.
1.	Dr. F. U. Khan	Professor/Chief Scientist & Head	fukhanskuastk@rediffmail.com	9469075181
2.	Dr. Neelofar	Professor/Chief Scientist	neelofaruka@yahoo.co.in	9419062453
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5.	Dr. Z. A. Qadri	Assistant Professor/Jr. Scientist	drzaqadri@gmail.com	9796762567
6.	Dr. N. H. Masoodi	Assistant Professor/Jr. Scientist	masoodi_nasir@yahoo.com	9797973911
7.	Dr. K. M. Malik	Assistant Professor/Jr. Scientist	kmalik2014@gmail.com	9906491753

Students at a glance

A. Degree Awarded: Students Pass out since inception (1992) till date (17-04-2015)

Degree Programme	No. of students awarded degree
M. Sc.	31
Ph. D.	16

B. Students on Roll: At present (17.04.2015)

Degree Programme	No. of students on Roll
M. Sc.	06
Ph. D.	10



Prof. F. U. Khan





हर कदम, हर उमर
किसानों का हमसफर
भारतीय कृषि अनुसंधान परिषद

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