

# ANNUAL REPORT

## 1997-98



भारत  
ICAR

**NATIONAL RESEARCH CENTRE FOR ORCHIDS  
INDIAN COUNCIL OF AGRICULTURAL RESEARCH  
SIKKIM**



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PAKYONG, SIKKIM - 737 106

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## Preface

Sikkim is the natural home for about 475 species of orchids found in various climatic conditions from warm and humid, hills to snow peaks spread over a vast area of 7096 sq. kms, and therefore, is agroclimatically suitable for growing species of Orchids as well as temperate flowers like Lillium, Anthurium & Gladiolous. In order to find an alternative source of income supplementing their economy as well as to popularise Orchids and temperate flowers in National and International market, the National Research Centre for Orchids was established in October, 1996 for providing research support for Orchids and other temperate flowers.

I would like to invite the attention of environmentalists / ecologists on important aspect about unscrupulous collectors, for monetary gain, strip out of Orchids from forests and hills very frequently. Epiphytic species are in danger of losing their natural homes because of rapid dwindling of indigenous forests/hills. Ground Orchids are also facing extinction as a result of unplanned deforestation. Therefore, it is becoming difficult day by day to preserve the natural habitat of the Orchids in Tropical and temperate region of the Nation . Some definite and strict steps are absolutely necessary to save the native Orchids/temperate floriculture wealth of Himalayas. Collection of Orchids from their natural abodes are in progress. Accordingly, in order to achieve the goal about 150 species of local germplasm from Eastern Himalayan region have been collected and maintained for their conservation and evaluation. About 20 hybrids of Cymbidium Orchids have been collected and maintained at our farm .

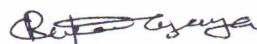
The research work has been initiated on standardization of potting media including local available materials to be used on commercial scale and standardization of foliar application of nutrients. The efforts are also being made to establish a tissue culture unit for mass multiplication of plants since the desirable planting materials are very costly. Presently, the Director(Act) and only two Scientists are in position Efforts are also being made for taxonomical studies by nominating/inviting visiting Scientists. The development of Regional Centre at Darjeeling is also in progress as per its mandate. As far as practicable the Centre is providing the research and technical services to cater the needs of farmers, nurserymen and other entrepreneurs.



It gives me immense pleasure to publish the first Annual Report of the Centre. I am glad to record for NRC(Orchids) in the Golden Jubilee year of Independence of India which depicts a panorama of research activities and achievements of the Centre involving a multidisciplinary team approach. The Centre is being conducting research on all aspects of Orchids and Temperate Flowers with an objective to enhance the production and productivity of temperate floriculture through basic and strategic research, to serve as a national repository for Orchids, to act as a Centre for training and updating the research methodologies and technologies of Orchids besides collaborating with national and International agencies in achieving the above mandate.

I would like to express my gratitude to Hon'ble Dr. R.S. Paroda, Director General, I.C.A.R., Dr. S. P. Ghosh, Deputy Director General(Hort), ICAR and Dr. D.P. Singh, Astd. Director General(Vegetable Crops), I.C.A.R. for their constant guidance and encouragement. I wish to complement with appreciation of all the Scientists and Staff members who put their best efforts for all success and also in the compilation, editing and preparation of this Annual Report.

I do hope that this Centre will definitely take the job with great sense of responsibility in the years to come.



(R.C. Upadhyaya)  
Director

Pakyong  
September, 1998



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## Summary

In the history of I.C.A.R., it is the first NRC of floriculture with special mandate on Orchid research and other high value cut flowers. To meet the challenges, careful planned strategies with commitment of the available at the Centre will provide the technological support to the marginal farmers/growers and tribal community of NEH Region.

The NRC for Orchids which came into existence in October, 1996 and our efforts were focused on infrastructure development and streamlining the research activities from its resources to achieve excellence in research in years to come inspite of the fact that there are only two scientific staff available at the Centre. The efforts are also being made for linkages development with expert nurserymen and universities. Two projects have been taken up, one on "Protect net cultivation of Orchids" and other on "Post harvest management of Orchids and collection and evaluation of bulbous flowering species from Himalayas" under NATP Programme. Four low cost bamboo made poly houses have been constructed and germplasm are maintained properly. Basic equipments like Plant Growth Chamber, BOD Incubators and other Instruments worth Rs. 20 lakhs have been procured.

The research work phase was emphasized in first phase as priority task on collection, evaluation and conservation of Orchids, suitable potting media specially with locally available materials and foliar applications of nutrients. About 150 species of 32 generas of Orchid germplasm have been collected and evaluated. The observations on flowering traits including flowering time are recorded. Special efforts are made to collect the extinct, endangered and rare species of Orchids which are important from horticultural or breeding point of view.

The effort are also being made to provide Internet connectivity, through VSAT as the centre is located in a remote area where telephonic links are difficult to get. The technical, administrative and supporting staff has been recruited and other vacant posts on deputation basis are being filled for smoother functioning of the Centre. CPRI, Darjeeling Centre has been taken over to conduct the research on lilliums and temperate Orchids. Efforts are also being made for taxonomic studies by nominating/inviting visiting Scientists.



## Introduction

The fascinating Orchid flowers exhibit an incredible range of diversity in size, shape, structure number, density, colour and fragrance. They flower regularly in almost all the colours and variations. The unmatched ornamental value of orchid flowers accounts for multimillion dollar-cut-flower trade in International Market. They provide cut blooms which keep fresh for long, and add to the variety of floral arrangements. Though, there is often a preference of hybrids in commercial trade yet in beauty and other blossom characters many native species stand as competitors with best hybrids. Some of them even enjoy a national flower status, such as *Dendrobium nobile* is the state flower of Sikkim. The Orchidaceae is one of the largest families of the flowering plants. Out of about 2000 species, about 750 genera known to occur in the warm humid parts of the world, nearly 1300 species are estimated to occur in India. A total of 475 species of about 100 genera of Orchids have been recorded, so far from Sikkim alone.

The bountiful rainfall of about 1500 to 2500 mm per year distributed over long period from April to October and relative humidity of 75% to 95% provide climatic conditions well suited for temperate Orchids. Among the environmental hazards the obliquity and effectiveness of biotic pressure is quite fairly recognised and with the rise in population in the hills of Eastern Himalayas. Unfortunately the natural orchid population is on the decline due to excessive collection and over harvesting by traders or botanical explorers or by hobby collectors or by deforestation. Further more, many orchids are becoming "endangered or threatened" on account of habitat destruction, area development and industrialization. According to scientific estimates as many as 147 are under the threat of extinction world wide. India needs concerted efforts to protect orchids wealth and required their conservation. Biosphere reserves, orchid sanctuaries and orchidarias have met with limited success. Banning of orchids from naturally grown forests is right step by the Government, Since there has been a tremendous erosion of orchid genetic diversity and it warranted *in situ* or *ex situ* conservation. The Orchids live in a delicately balanced equilibrium with their ecosystem, they are highly vulnerable to habitat destruction and serve as excellent indicators of environmental degradation.

The economic importance of orchids lies mainly in their ornamental value, but many orchids are used in the traditional system of medicine for using a number of ailments. They are rich in alkaloids, flavinoids, glucosides, carbohydrates and other phyto-chemical contents. The beautiful *Vanda coerulea* is extensively used for eye disease by the Tribal people of Eastern Himalaya. The juice of its flowers as eyedrop is believed to cure glaucoma, cataract and even blind-



*Dendrobium nobile*



*Vanda coerulea*



ness. The flowers of *Dendrobium nobile* are also used for various eye troubles. The whole plant of *Paphiopedilum insigne* is said to be very useful for stomach trouble such as amoebic dysentery. Some orchids are used in local medicines for treating nervous disorders (*Cymbidium elegans*, *Cypripedium pubescens*, *Epipactis latifolia*) and are well documented. *Vanilla planifolia* and *V. fragrans* are the source of the essence vanillin.

Unfortunately orchids have not yet gained the attention and popularity they deserve in spite of the fact that most of them have commercial value. The cumulative result of such causes has now necessitated strict conservation and mass multiplication with native species as they are potential material for commercial value. Over the past two decades, there has been increase in awareness for conservation, cultivation and commercialization of Orchids. Sikkim in particular is a place having rich collection of orchid species and hybrids. Private or hobby growers have gained considerable scientific expertise to grow them on large scale. In view of the export potential of Orchids and other cut flowers and



Visit of dignitaries at NRC

limited research support available and based on the recommendations of the Planning Commission, the Indian Council of Agricultural Research established a National Research Centre for Orchids. Hon'ble Dr. R.S. Paroda, Director General, along with Dr. K.L. Chadha, Dy. Director General (Hort) and along with other dignitaries of Indian Council of Agricultural Research, New Delhi visited on 5th October, 1996 at Gangtok to attend Regional committee meeting Zone III. They also paid visit to the NRC for Orchids at Pakyong and Hon'ble Dr. Paroda was kind enough to suggest to modify its name as NRC for Orchids and floriculture. Dr. R.S. Paroda, Director General, ICAR and Dr. K.L. Chadha, the then Dy. Director General (Hort) was also kind enough to visit the farm on 5th October, 1996 and inaugurated the NRC for Orchids for its working. The 5th October being the inauguration day has been decided the raising day of the centre. But in the 69th meeting of the Senior Officers Committee of the I.C.A.R., it has been decided to expand the mandate of NRC for Orchid to cover other crops like Iris, Lillium, Anthurium and Gladiolus, but major focus will remain towards Orchids and not to be changed the name of the centre presently. The NRC for Orchids also took over Darjeeling centre of C.P.R.I, in the month of October, 1997 and will undertake research on temperate bulbous flowering plants and temperate Orchids including their micropropagation. The establishment of Darjeeling Centre has been taken up in IXth Plan to upgrade the research activities.

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## Mandate

- To collect, evaluate and conserve Orchids and other temperate bulbous flowering plants.
- To systematically breed and evolve commercial varieties and hybrids of superior quality of orchids for national and international trade.
- To standardise propagation, agro-techniques for commercial cultivation and package of practices for post-harvest management of orchids for domestic and export markets and other bulbous flowering plants of commercial value.
- To act as a repository of information about, and as a centre for training on, orchids and other floricultural crops.
- Standardisation of post harvest management of cut flowers for trade.

## Objectives

- Collection, conservation and evaluation of germplasm and development of National repository of temperate commercial flowers and Orchids.
- Development of low cost production technology for Cymbidium Orchids.
- Evaluation of other locally adopted orchid species for cut flower or potted plant of commercial value.
- Standardisation of tissue culture techniques for mass multiplication of desirable clones to improve availability of planting material of good quality.
- Development of export worthy orchid lines through a variety development programme.
- Systematic work on disease and pest management of Orchids and other temperate commercial flowers.
- Standardization of package of practices for commercial cultivation of Orchids, Anthurium, Lillium and Gladiolus.
- Post harvest management of cut flower for trade within National and International markets.



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## Priority Task

- Collection , conservation and evaluation of local germplasm . The National Research Centre for Orchids in Sikkim should eventually be developed as the National Repository for the Orchids. Proper evaluation of local germplasm as potential donors in breeding programme should also be attempted simultaneously.
- Development of production technology of Cymbidium and its hybrids to be undertaken on mission mode basis to provide much needed technological support to the orchid trade of Sikkim and neighboring areas. In the last two decades many hybrids of Cymbidiums have been introduced in Darjeeling and Sikkim. So for giving flip to the budding orchid trade, suitable production technology, both for potted-plants and cut-flower to be developed urgently. Low cost green houses/poly houses to be designed for commercial cultivation of Orchids in Sikkim.
- Systematic work to ascertain the commercial value of locally adopted orchids for production of cut-flower and pot-plants need to be initiated. Species like *Coelogne cristata*, *Coelogne nitida*, *Calanthe species*. and *Dendrobium species* can be made use for producing potted plants. Planned experimentation to evolve appropriate location specific production technology and post-harvest practice are essential. Measures for plant protection and water requirements for local species as well as exotic varieties need to be standardized on priority basis.
- Shortage of quality planting material of selected clones of Cymbidium and other important species to produce is often indicated as one of the major constraints to make orchid trade commercially viable. Standardisation of tissue culture technique for mass scale production of desirable clones is therefore needed.
- Systematic replacement of old outdated varieties with better varieties is needed for introduction of selected commercial varieties and hybrids and their field testing under local conditions should be planned. Eventually, NRC should venture into strong varietal development programme for developing export worthy orchid varieties and a beginning should therefore be made now.
- High humidity along with optimum temperature is very congenial for spread of pathogens, so systematic work has to be taken up on diseases and pests urgently by National Research Centre for Orchid and beginning should be done immediately.

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## *Location*

National Research Centre for Orchids is situated at Pakyong on the Pakyong - Rhenock Road which is 35 km. from the capital , Gangtok, Sikkim. It is about 2 kms. Away from Pakyong which is a Sub-divisional town of East Sikkim District. The farm is located on hilly terrain at 1300 m above m. s. l. The average rainfall at Pakyong ranges from 2000-2500 mm per annum distributed mainly from April to October. Humidity varies from 75%-95%, whereas temperature ranges between 5oC during winter and 25C during Summer. The farm is connected by black top road. The Sikkim state authorities have approved and handed over about 9.98 hectares of land which was in possession of the Regional Agricultural Centre along with other assets to the NRC for Orchids.



## Farm and Infrastructure Development

Possession of land was taken over in the month of October 1996 from State Agriculture Department. Two black top roads are connected to the farm one at down side and other divided the farm mid level. The upper terrain of about 10 acres with terraced land and mild slope has been identified for research and construction of administrative building in first phase alongwith Poly and Orchid Houses. About 4 acres farm area at down slope of the road is retained as forest for *in-situ* conservation of Orchids. About 500 seedlings of *Alnus nepalensis*, mango, khasi cherry and bamboos are planted in the farm area. The upper terrain from the road have existing R. C. C. building consisting of 3 rooms, godown, two type II quarters and two type IV quarters. The existing building has been renovated and electrical fitting has been done to facilitate research works in Laboratories and smooth functioning of administrative works. The barbed wire fencing of the farm area is in progress by C.P.W.D. The land has been properly terraced and leveled wherever possible and needed. The four low cost poly house structures are ready for research and maintenance of plants. Collection of planting material and their evaluation are in progress. Telephone connection has been provided in administrative building at farm and office.

The land has been developed and seasonal flowering crops are grown for seed production. Orchids are collected and maintained at the site. The farm paths have been mended and terraces are repaired. The terraced land has been used for cultivation and maintenance of various floricultural crops specially bulbous flowering plants. Contour map of farm land has been prepared through CPWD and Soil survey has been conducted by NBSS & LUP, Calcutta Centre for its Capability Classification.

**LAND & BUILDINGS :** The land for the farm and buildings have been provided by the Govt. Of Sikkim. The ICAR Research Complex for NEH Region, Sikkim Centre, Tadong, Gangtok provided temporarily two rooms of Scientists' Home for office. The Farm Office, Laboratory and Library has been established at Pakyong in old building handed over by the State Govt. alongwith the land. The old buildings are being renovated by the C.P.W.D, Arrangements are being made to shift the Office from Tadong to Pakyong very shortly. The Master Plan of the Centre is under final designing for Laboratory-cum-Office complex.

**VEHICLE :** One Gypsy double door vehicle has been purchased for the Centre.

**EQUIPMENTS :** Basic equipment's have been purchased as per EFC Memo of VIII Plan to start the research work. Basic amenities such as Telephone, Fax, Computers, Typewriters (Manual & Electronic) , Duplicating Machine, Plain Paper Copier have been provided. The "V" SAT likely to be installed at Pakyong with E-mail and Internet facilities within a month or so.

**LIBRARY** : The library of NRC for Orchids has been established and about 100 books related to Orchids and floriculture, 30 books on administrative rules have been procured.

**NRC FOR ORCHIDS, DARJEELING CENTRE** : The Regional Station of CPRI, Shimla has been handed over to this Centre alongwith with Old building with about 1.2 acres of land and a 1972 model Jeep. The building is under renovation by the C.P.W.D. The old vehicle being obsolete, is likely to be replaced shortly.



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## *Other Activities*

As far as practicable Noting & Drafting in Hindi have been started. "Rajbhasha Karyanayan Samiti " under the Chairmanship of Director has been constituted in order to extract maximum possible works in Hindi. Efforts are also being made to publish Scientific papers/research articles in Hindi.

A Contributory fund has been created to facilitate financial assistance to lower staff and their families engaged at this Centre for Medical treatment and for special Occasions. Particularly, at the time of their festival the field workers are rewarded by distributing sweets/clothes from the available fund. All staffs of this Centre are participating for this grand activities by donating money to the fund voluntarily.

*Weather Conditions*

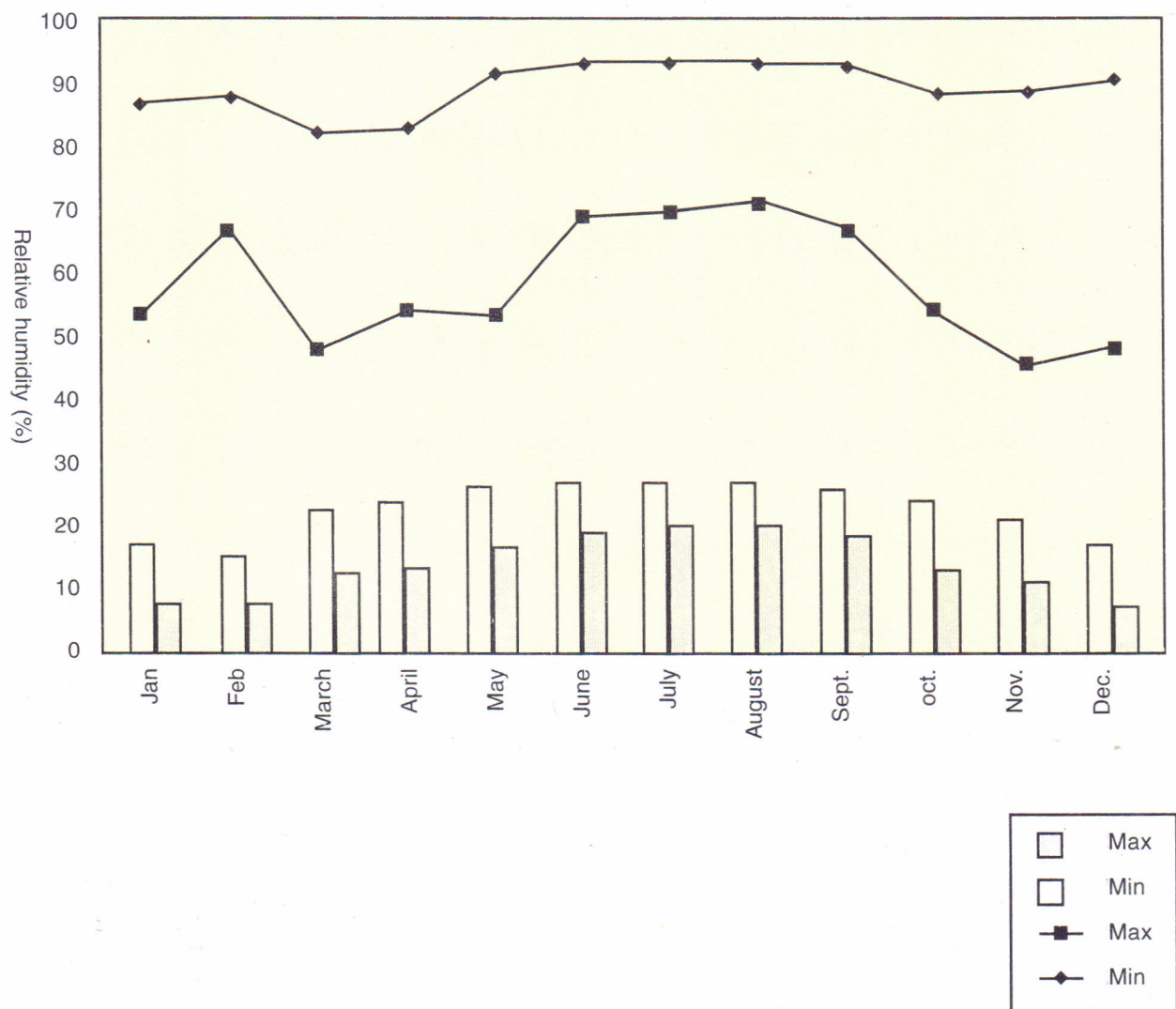
The constituents of the climate are the most important factors which determine the productivity and quality of the flowers. The data on rainfall, humidity, temperature, sunshine hours and evaporation per day were recorded for the year 1997 and are given are given below: (Table and graph)

**Monthly average of Meteorological Observations, 1997**

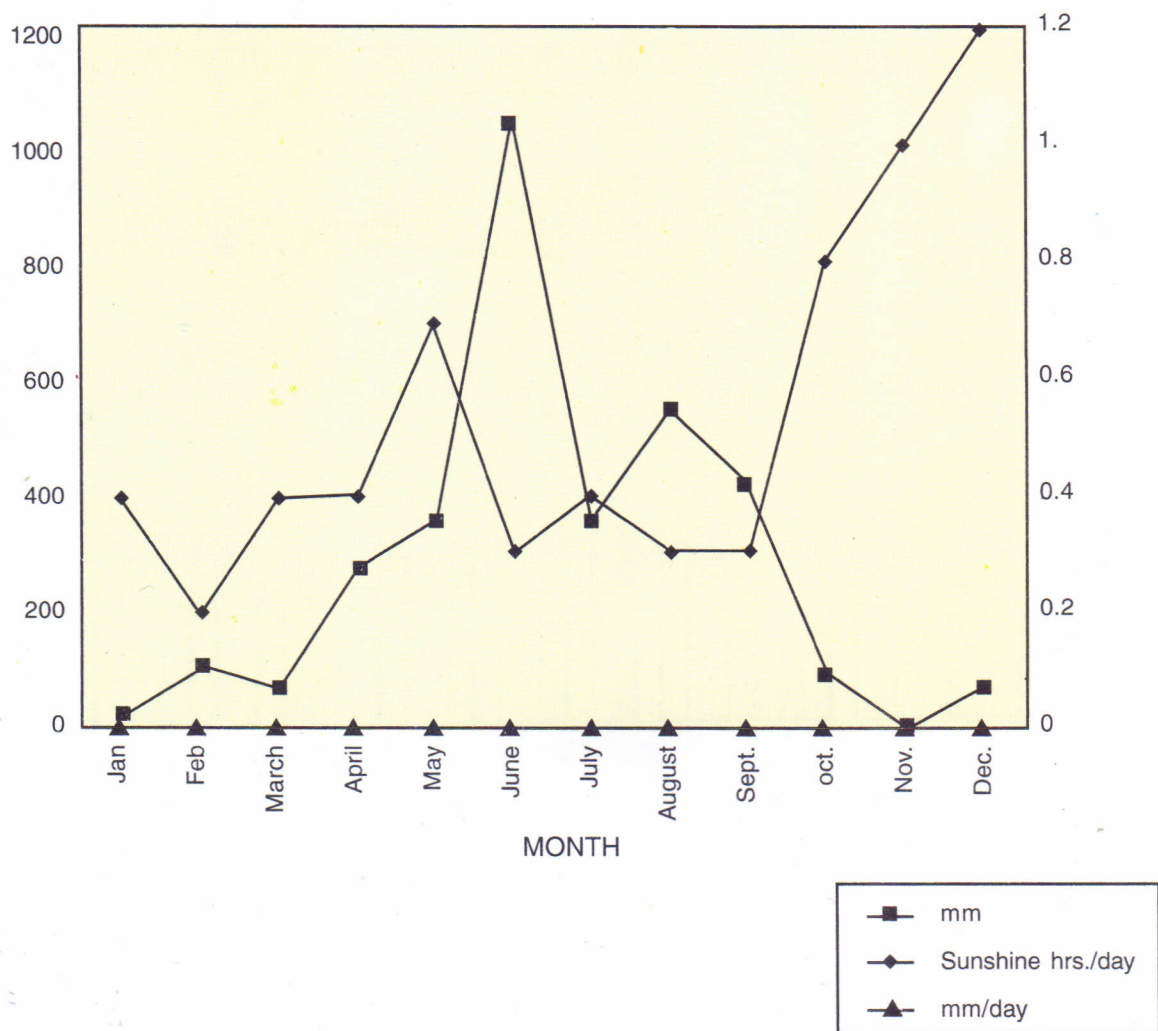
Month	Temperature°C		Relative Humidity (%)		Rainfall mm	Duration of Sunshine hrs/day	Evaporation mm/day
	Max	Min	Max	Min			
Jan	15.9	6.4	85.5	52.2	25.9	3.6	0.4
Feb	13.7	6.5	86.6	65.7	107.2	2.2	0.2
March	21.6	11.6	81.2	46.8	68.4	4.6	0.4
April	22.8	12.6	82	53.5	277	3.2	0.4
May	25.7	16.2	90.9	52.7	359.8	4.2	0.7
June	26	18.4	92.6	68.4	1038.8		0.3
July	26.6	20	92.5	69.6	360.7		0.4
August	26.8	19.7	92.8	70.8	547.8		0.3
Sept.	25.9	18.6	92.3	66.6	422.9	2.5	0.3
Oct.	24	12.8	88.3	54.4	86.2	6.5	0.8
Nov.	21.3	11	88.8	46.2	0.8	4.5	1
Dec.	17.1	7.5	90.9	48.9	66.7	2.6	1.2



Chart : Meteorological Observations of Relative humidity and Temperature, 1997



**Chart : Meteorological Observations of Rainfall, Duration of Sunshine and Evaporation, 1997**





## Research Activities

**Project 1. Collection, conservation, maintenance and evaluation of Orchids germplasm from N. E. Himalayas.**

**D.Barman, Rampal & R.C.Upadhyaya**

Germplasm collection : Efforts were made to collect germplasm from Sikkim, Darjeeling dist. Of West Bengal , Arunachal Pradesh, Meghalaya, and Manipur. About 150 species of 32 genera have been collected and are being maintained at farm for their evaluation and conservation. The list is given below :

**1. Aerides Lour**

- (a) *Aerides fieldingii* Williams (Jennings)
- (b) *Aerides multiflora* Roxb.
- (c) *Aerides williamsii*

**2. Arachnanthe Bl.**

- (a) *Arachnanthe clarkei* Rolfe

**3. Arundina Bl.**

- (a) *Arundina graminifolia* var. *Abhijit villa*
- (b) *Arundina graminifolia* var. *Alba* (D.Don) Hochr.
- (c) *Arundina graminifolia* var. *Chinensis*
- (d) *Arundina graminifolia* (D.Don) Hochr.

**4. Ascocentrum Schltr.**

- (a) *Ascocentrum ampullaceum* (Roxb.) Schltr.

**5. Anoectochilus Bl.**

- (a) *Anoectochilus brevilabris* Lindl.

**6. Bulbophyllum R. Br.**

- (a) *Bulbophyllum affine* Lindl.
- (b) *Bulbophyllum hirtum* Lindl.
- (c) *Bulbophyllum leopardinum* Lindl.
- (d) *Bulbophyllum wallichii* Rchb. f.

**7. Calanthe R. Br.**

- (a) *Calanthe maculata* Lindl.
- (b) *Calanthe masuca* D. Don (Lindl.)
- (c) *Calanthe triplicata* Ames.

**9. Coelogyne Lindl.**

- (a) *Coelogyne barbata* Griff
- (b) *Coelogyne corymbosa* Lindl.
- (c) *Coelogyne cristata* Lindl.
- (d) *Coelogyne cristata* var. *alba*
- (e) *Coelogyne flaccida* Lindl.
- (f) *Coelogyne flaccida* x *cristata*
- (g) *Coelogyne nitida* (Wall. ex. Don) Lindl.
- (h) *Coelogyne ochracea* Lindl.
- (i) *Coelogyne stricta* (D. Don) Schltr. l.

**10. Cymbidium Sw.**

- (a) *Cymbidium aloifolium* (L.) Sw.
- (b) *Cymbidium devonianum* Paxt
- (c) *Cymbidium eburneum* Lindl.
- (d) *Cymbidium giganteum* Wall. & Lindl.
- (e) *Cymbidium lowianum* Rchb.
- (f) *Cymbidium munronianum* King & Pantl.
- (g) *Cymbidium tigrinum* Parish
- (h) *Cymbidium tracyanum* Hort.
- (i) *Cymbidium whiteae* King and Pantt.

**11. Cirrhopetalum Lindl.**

- (a) *Cirrhopetalum maculosum* Lindl.
- (b) *Cirrhopetalum wallichii* Lindl.

**12. Dendrobium Sw.**

- (a) *Dendrobium aggregatum* Roxb.
- (b) *Dendrobium anceps*, Sw. (Wall. ex. Lindl)
- (c) *Dendrobium aureum* Lindl.
- (d) *Dendrobium crepidalium* var. *Assamensis*
- (e) *Dendrobium crepidatum* Lindl.
- (f) *Dendrobium chrysotoxum* Lindl.
- (g) *Dendrobium densiflorum* Lindl.
- (h) *Dendrobium falconeri* Hook
- (i) *Dendrobium heterocarpum* Lindl.
- (j) *Dendrobium infundibuliform* Lindl.
- (k) *Dendrobium jenkinsii* Wall. ex Lindl.
- (l) *Dendrobium lendleyi* Sten
- (m) *Dendrobium moschatum* Sw.
- (n) *Dendrobium nobile* Lindl.
- (o) *Dendrobium pierardii* Roxb.
- (p) *Dendrobium primulinum* Lindl.
- (q) *Dendrobium sulcatum* Lindl.
- (r) *Dendrobium williamsonii* Day & Rchb.

**13. Epidendrum**

- (a) *Epidendrum* sp.



14. **Eria Lindl.**
  - (a) *Eria pubescens* ( W.J. Hook.) Steu.
15. **Goodyera R. Br.**
  - (a) *Goodyera sp*
16. **Habenaria Wild**
  - (a) *Habenaria sp..*
17. **Lycaste Lindl.**
  - (a) *Lycaste sp.*
18. **Lusia Gand.**
  - (a) *Lusia filiformis* J. D. Hook.
19. **Mycrostylis Nutt.**
  - (a) *Mycrostylis opiculatus*
20. **Neogyne Rehb. F.**
  - (a) *Neogyne gardneriana*. Rchb. f .
21. **Oncidium Swartz.**
  - (a) *Oncidium sp*
22. **Pholidota Lindl.**
  - (a) *Pholidota imbricata* W. J. Hook
23. **Pleione D. Don.**
  - (a) *Pleione humilis* (Smith) D. Don
  - (b) *Pleione maculata* Lindl.
24. **Phaius Lour**
  - (a) *Phaius flavus* Lindl.
  - (b) *Phaius mishmensis* Rchb. f.
  - (c) *Phaius tankervilleae* (Ait.) BI
  - (d) *Phaius wallichii*
25. **Paphiopedilum Pfitz.**
  - (a) *Paphiopedilum fairieanum* (Lindl.) Pfitz.
  - (b) *Paphiopedilum hirsutissimum* (Lind.) Pfitz.
  - (c) *Paphiopedilum insigne* (Wall.) Pfitz.
  - (d) *Paphiopedilum spicerianum* (Rchb. f. ) Pfitz.
  - (e) *Paphiopedilum venustum* (Wall.) Pfitz.
26. **Phalaenopsis Bl.**
  - (a) *Phalaenopsis mannii* Rchb.
27. **Renanthera Lour.**
  - (a) *Renanthera imschootiana* (Lindl.) Rolfe.

29. **Stauroopsis Rchb. f.**  
(a) *Stauroopsis undulata* Benth.
30. **Thunia Rchb. f.**  
(a) *Thunia alba* Rchb. f.  
(b) *Thunia marshalliana* Rchb. f. *Thunia venosa*. Rolfe
31. **Tainia Bl.**  
(a) *Tainia species*
32. **Vanda R. Br.**  
(a) *Vanda alpina* Lindl.  
(b) *Vanda coerulea* Griff. ex. Lindl.  
(c) *Vanda coerulea* x *Vanda roxburgaii*  
(d) *Vanda cristata* Lindl.  
(e) *Vanda stangeana* Rchb. f.  
(f) *Vanda teres* (Roxb.) Lindl.  
(g) *Vanda wroth*
32. **Vandopsis Pfitz.**  
(a) *Vandopsis sp.*
33. **Zygopetalum**  
(a) *Zygopetalum litermedium*
34. **Cymbidium Hybrids**  
(i) Hawtesence  
(ii) Hupa lash  
(iii) Sanfransisco "Monalisa"  
(iv) Khyberpass X Show girl  
(v) Joyful  
(vi) Takarajoke  
(vii) Cooks Bridge  
(viii) Eden Valley Bonanza  
(ix) Nerella Jenifer Gail  
(x) Show Girl Cooks Bridge  
(xi) Soul Hunt  
(xii) Great Day Sunset x Red Star  
(xiii) Khyber pass Rowes Red x Red Star.  
(xiv) Bull Barrow x Will Stutely  
(xv) Camalex x Sensation Chainti  
(xvi) Ammes Bury



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## **Maintenance, conservation characterization and evaluation**

The emphasis on conservation of Orchids is given on in-situ condition so as they can grow on natural conditions on the host trees. Although, the Orchids are also conserving in the low cost green are and net house. The Orchids are potted in suitable potting mixture consisting of bricks , charcoal, sand, leafmould. Irrigation and nutrient mixture are also provided at regular interval along with plant protection chemicals for maintaining a proper growth and development. Some of the rare, endangered and extinct species of Orchid are also collected and maintained at our Poly house for their multiplication and evaluation (table) .

**Project 2 :                   Standardisation of agrotechniques for cut flower production of Orchid hybrid.**

**D. Barman, R.C. Upadhyaya & Ram Pal**

Experiment No. 1 : Foliar application of nutrients for growth, blooming and quality flowers of orchids

An experiment has been initiated with 12 treatment combinations of NPK for foliar application to the Cymbidium hybrid var. Cooks Bridge in replicated pots (32 pots in each treatment) . The experiment was laid out in the month of September 1997 and observation are continuously recorded and will be reported in next year .

**Experiment No. 2 : Standardization of potting media for growing Cymbidium hybrid.**

An experiment was conducted with eight treatment combination of potting media components which includes local materials in replicated pots (30 pots in each combination). One year old Cymbidium hybrid were taken in pots size of 8" diameter. The nutritional doses were kept constant in all treatments. Experiment is in progress.

**Project 3 :                   Standardisation of agro-techniques for cut-flower production of gladiolus.**

**Rampal, D.Barman**

Experiment No. 1 : Varietal evaluation trial

An experiment with RBD design in three replicated plot was laid out of ten promising gladiolus cultivars namely Black beauty, Rippling water, Summer pearl, Eight

wonder, Ice gold, Tiger flame, Her majesty, American beauty, Jester, Summer sunshine. Observation on growth, cut flower and bulb formation will be required and reported next year since trial was laid out in march' 98

Experiment No. 2 : Spacing cum varietal Trial :

A trial was conducted with ten cultivars namely American beauty, Eight wonder Summer sunshine, Her majesty, Summer pearl, Jester, Tiger flame, Rippling water, Black beauty and Ice gold with three spacing i.e 20 cm X 20 cm, 30cm X 20 cm & 30 cm in factorial RBD design in three replication during march'1998 . The observation will be recorded and will be reported in coming year.

Project 4 :

**Preharvest treatment of growth regulators on gladiolus for cut flower production in field and protected condition.**

**Rampal, Rajni and Dayamma**

A trial was laid out with five varieties namely Black beauty, American beauty, Summer sunshine, Eight wonder and Ice gold and bulbs were treated with GA3 - 1 M, 3 M, 5 M, 1 nM, 3pM, 5pM; 1BA - 1 M, 1 n M, 1 pM; GA3 5 M + 1BA ½M ; GA3 3 M, +1BA 1nM; GA3 . 1 M +1BA 1 pM for planting in field as well as in protected condition to observe the quality of cut flower and duration of flowering. Observation recorded will be reported nest year.



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## *Adhoc Research Projects*

**Project 1 : Protectnet**

The Project on Protectnet has been started functioning at this Centre. One Research Associate and One Sr. Research Fellow have been appointed. The Orchid and Poly houses sanctioned in the Project are under construction and equipments have been procured. The technical programmes on Orchids and lilliums are finalised with the Coordinator of the Project. The experiments will be laid out under Protectnet condition in the month of October, 1998 and planting materials for above experiments has been ordered. The Project will be terminated by the end of 1999.

**Project 2 : NATP Project on "Storage and Packaging Technology of Orchids of Eastern Himalayas and Production of quality planting material of selected types"**

The project has been formulated as Principal Investigating Centre and the same is likely to be finalized with in this financial year.

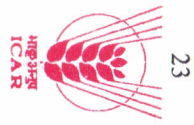
**Project 3 : A Project on "collection , conservation and evaluation of bulbous flowering plants of eastern himalayas."**

The project has been formulated as Co-Principal Investigator under NBPGR for mission mode project on bio-diversity conservation. The same is likely to be finalised shortly.

TABLE : VEGETATIVE AND FLOWERING OBSERVATIONS OF ORCHIDS GERMPASM.

Name of species	Plant height (cm)	No. of leaves /plant	Length of leaves (cm)	Width of leaves (cm)	Time flowering	Length spike (cm)	No. of Flowers /spike	Length of floral stalk (cm)	Type of inflorescence	Flower size (cm)	Length width of sepal (cm)	Habitat
<i>Aerides williamsii</i>			18-22.5	2-4		15.5	18	8			7	Epiphytic
<i>Coelogyne flaccida</i> X <i>cristata</i>			20-23	3-3.5	March-April	21-22.5	6-8	7-7.5	Drooping	4.0	3-3.2.5	Epiphytic or Lithophytic
<i>C. nitida</i>			+16	2.2-2.5	April-May	12-12.4	4-5	7.5-8	Drooping	5.0	2-2.2	-do-
<i>C. stricta</i>			40-45	6-6.5		30-32						-do-
<i>Cymbidium lowianum</i>		6-8	90.0	3.0	Nov.-Feb.	93-95	22	3.5-6	Stout	10.0		Terrestrial, Epiphytic, Lithophytic, rarely saprophytic
<i>Cirrhopetalum maculosum</i>			9-15	2.5		6-9.5	Few					
<i>Arundina gramini folia</i>	92-122		25-26	1.5-1.7	April-	14-16	2-3	3-3.5	Terminal	4.5-6.5	4.5-5/1.5-2	Terrestrial
<i>Arachnanthe clarkei</i>	30.0		20-22	2.8-3.0	Nov.-	5-5.5	2-4	8	Solitary	7.5-8	3.8-4/5	
<i>Coelogyne barbata</i>	10.0	5	8.6-8.8	1.9-2	Oct.	25.4-25.5	2	2.6	Erect	7.0	1.5	Epiphyte
<i>Dendrobium sulcatum</i>	25		13-14		March-April	10.5-11			Short	2.5		Epiphytic
<i>Dendrobium pierardii</i>	88-92		7.5-12	1.8-2	April-May		40-46	2-2.8	Short	3.2-3.5	1.5/5	Epiphytic
<i>D. chrysotoxum</i>	30		11.8-13.5	2.9-3.3	April-May	12-13.5		3.5-4.5	Semi-dropping	5.0	1.5-1.9/1.2	Epiphytic
<i>D. crepidatum</i>	30				April-May			3.2-3.5	Short	4-4.1	2.5/1-1.5	-do-
<i>D. primulinum</i>	30		10.0		April	20-22	8	6.5-7	Erect	5.0	3-3.5/5	-do-
<i>D. nobile</i>	90		11-12	3-3.2	March-May				Short	6-6.3	4-4.5/2-2.3	-do-
<i>Phaleonopsis mannii</i>			23-23.5	7.5-8		8-8.5	8	4-4.2		3-4	1.8-2/5	-do-
<i>Anoectochillus sikkimensis</i>	15-25	4-5	3.5-4.5	2-2.1	Sep-Oct	25	10-15		Erect	1.5		Terrestrial





Renanthera imschootiana	90		7-7.5	2-2.5	May-July	30-32	1-6	13-13.5	Semi erect, horizontally spready	5-5.2	2.7-2.8/ 1-1.5	Epiphytic
Stauroopsis undulata	1.5		10	2	April-May	20	10					-do-
Vanda coerulea	90	16	22.2	1.8	Oct	62.2-62.5	8	5-8	Erect	10.0	3.3	-do-
V. stangeanum			22-22.5	1.5-2		12-13		7		4-4.5	1.5-1.6/1	-do-
V. teres		12	17.6	.7	March-April	29.8-13	1	1.7		10.0	3.3	-do-
V. cristata	15		12.5-13	1.1-1.2	May		1-2		Short erect raceme	3.6-5	2.9-3.2/5	-do-
D. heterocarpum	130		18.5	2.5	March-April		2 to 3	3-3.5	Solitary	5.0		-do-
Epidendron indicum			4.5-4.9	1-1.5	March-April	6.1			Terminal	2.6		-do-
Lycaste		.3	42.2-2.5	7.2	Oct	14.1-14.5	1	4.8			6.1	
Neogyne gardneriana		2	14.3-4.5	7.8	Oct	14.3-14.4	13	1			4.4	
Plione humulis	4	1-2	15		Oct-Nov.	3.2	1-2	1.8	Long	5.0	3.8	Epiphytic/ lithophytic
Paphiopedilum insigne		5-6	10-13	2-3	Feb	9-18	1		Solitary	9		Terrestrial
P. venustum		5-7	10-15	2.5-6	Feb- March	12-15	1		Terminal solitary	5-7		-do-
P. hirsutissimum			30	4	Feb-March	9	1		-do-	9		
Goodyera			4.5-5	1-1.2	April- June	10-15.5	20-37	6-7.5	Semi horizontal			
Phaius wallichii			72-75	13-15		82-85	8-12	59-61		11-11.8	6/2.5	
Vandopsis			12.8-23	4-5.2	May	12-19	2-4	9-12	Semi horizontal	3-3.2	2/1.5	Epiphytic



## Budget Expenditure & Revenue Realisation

Total outlay for NRC on Orchids during the VIII Plan was Rs. 120 lakhs and Statements of budget and expenditure for the year 1997 - 98 is given below :

Head	Rupees in Lakhs		
	Budget Estimate expenditure	Revised B.E.	Actual Budget
Establishment Charges	10.00	10 .00	8.90
Traveling Allowance	1.50	1 .50	1.50
Works	38.50	30 .00	30.00
Other Charges	30.00	35 .00	25.00
<b>Total</b>	<b>80.00</b>	<b>71 .50</b>	<b>65.40</b>

### SANCTIONED STAFF STRENGTH

Sl. No. & Designation	Sanctioned	Filled	Vacant
1. Director	1	-	1
2. Principal Scientist (Hort.)	1	-	1
3. Sr. Scientist (Hort.)	1	1	- (Acting as Director)
4. Sr. Scientist (Biotechnology)	1	-	1
5. Sr. Scientist(Gen.& Cyto.)	1	-	1
6. Scientist (Ento.)	1	-	1
7. Scientist (Computer App.)	1	-	1
8. Scientist (Hort.)	1	1	-
9. Scientist (Eco. Bot.)	1	1	-
10. Scientist (Path.)	1	-	1
11. Scientist (Soil Chem.)	1	-	1

### TECHNICAL

1. T-II-3 (Horticulture)	1	1	-
2. T-II-3 (Computer)	1	1	-
3. T-I (Field Tech.)	1	1	-
4. T-I(Driver)	1	1	-

**ADMINISTRATIVE**

1. Assist. Admn. Officer	1	-	1
2. Assist. Actt. Officer	1	-	1
3. Assistant	1	-	1
4. Stenographer/P.A to Director	1	1	- (deputation)
5. Senior Clerk	2	-	2
6. Junior Clerk	2	2	-

**SUPPORTING**

1. Lab Attendent	1	1	-
2. Watchman	1	1	-
3. Messenger	1	1	-
4. Mali	1	1	-
5. Safaiwala	1	1	-

## POSITION OF STAFF ( as on 31.03.1998)

### Research Management

- |                       |                 |
|-----------------------|-----------------|
| 1. Dr. R.C. Upadhyaya | Director (Act.) |
|-----------------------|-----------------|

### Scientists

- |                         |                   |
|-------------------------|-------------------|
| 1. Dr. Dwijendra Barman | Scientist (Hort.) |
| 2. Mr. Rampal           | Scientist (Hort.) |

### Technical

- |                            |                      |
|----------------------------|----------------------|
| 1. Shri P.B. Subba         | T-II-3 (Field Tech.) |
| 2. Shri Sunil Kumar        | T-II-3 (Computer)    |
| 3. Smt. Pema Choden Bhutia | T-II-3 (Hort.)       |
| 4. Shri G.B. Mukhiya       | T-1 (Field Tech.)    |
| 5. Shri Dikendra Bhujel    | T-1 (Field Tech.)    |
| 6. Shri Ram Chadra Gurung  | T-1 (Driver)         |

### Administrative

- |                             |                                    |
|-----------------------------|------------------------------------|
| 1. Smt. Lakit Lepcha        | Assistant                          |
| 2. Shri Debabrata Bannerjee | PA to the Director (on deputation) |
| 3. Smt. Diki Bhutia         | Junior clerk                       |
| 4. Smt. Dilmaya subba       | Junior clerk                       |

### Supporting

- |                              |                                  |
|------------------------------|----------------------------------|
| 1. Shri Shyam kumar Tamang   | SSGr-III (Farm hand)             |
| 2. Shri Gopal Brahmin        | SSGr-II (Lab attendant)          |
| 3. Shri Phigu T. Bhutia      | SSGr-I (Messenger)               |
| 4. Shri Dawa Bhutia          | SSGr-I (Farm hand)               |
| 5. Shri Tularam Dulal        | SSGr-I (Farm hand)               |
| 6. Smt. Meena Chettri        | SSGr-I (Lab & Lib.<br>Attendant) |
| 7. Shri Trilok Singh Balmiki | SSGr-I (Safaiwala)               |

### Darjeeling Centre

- |                       |  |
|-----------------------|--|
| 1. Shri P.H. Singh    | Senior Scientist (P.P.) and<br>Incharge(CPRI )<br>On temporary posting |
| 2. Shri T. B. Singh   | SSGr-III (Office attendant)  |
| 3. Shri A. K. Chhetri | SSGr-III (From CPRI on   |

### SUPERANNUATION

- |                 |   |
|-----------------|---|
| Shri T.W. Dukpa | SSGr-IV (had retirement from Service on 31.03.1998)<br>(He was transferred with post from CPRI) |
|-----------------|---|



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## **Publications**

### **CHAPTER IN BOOKS**

Upadhyaya, R.C. (1998) National Research for Orchids - In " 50 Years of Horticulture Research. ICAR Publication, New Delhi : pp 122 - 123.

### **POPULAR ARTICLE**

Upadhyaya, R.C. (1996) National Research Centre for Orchids ICAR News, 2(3) : 4-5.

### **RADIO TALKS**

R.C. Upadhyaya, (1997) Orchids of Sikkim , AIR, Gangtok , 11 January.

### **POPULAR ARTICLE IN HINDI**

Upadhyaya, R.C. and Kumar, D. (1997) Sikkim Mein Orchids ka Utpadan. Phal Phul Swarna Jayanti Visheshank July - Sep : 61-63

### **PAPER PRESENTATION IN SEMINAR / WORKSHOP**

Agarwal, S ; Vij, S. P. and Upadhyaya R.C. (1997). Effect of peptone on synthesis of Biomolecules during seedling development in *Aerides muthflorum* Roxb.- A study in Vitro, Proceedings of, " Development of Biology and commercialization of Orchids" National Symposium organised by TOSI and NRC for Orchids at Gangtok on 12-13th April, 1997

Barman , D ; Pal, P and Upadhyaya, R.C. ( 1997) - Effect of organic and inorganic fertilizer on growth and flowering of *Chrysanthemum*. Proceedings of National Seminar on *Chrysanthemum* organized by *Chrysanthemum* society, N.B.R.I. Lucknow, 4th - 5th Dec., 1997.

### **PARTICIPATION IN WORKSHOP/TRAINING**

Barman, D. (1997) 5th National Symposium on "Developmental Biology and Commercialization of Orchids. Organised by TOSI, held at Gangtok, 13th - 14th April.

Barman, D. (1997) "Techniques in exploration and collection of agri. - biodiversity" at NBPGR , New Delhi, 20th - 29th September.

## Distintuished Visitors

Sl. No	Name	Designation	Date
1.	Dr. D. P. Singh	ADG (Veg.& Fl ), ICAR Krishi Bhawan, New Delhi	17.08.96
2.	Dr. R. P. Awasthi	Director, ICAR Research Complex For NEH Region, Barapani, Meghalaya.	17.08.96
3.	Dr. R.S. Paroda	Director General, ICAR, Krishi Bhawan, New Delhi	05.10.96
4.	Dr. K.L. Chadha	DDG(Hort), ICAR, Krishi Bhawan, New Delhi	05.10.96
5.	Prof. Gajendra Singh	DDG (Eng), ICAR, Krishi Bhawan, New Delhi	05.10.96
6.	Dr. M.L. Madan	DDG (AS), ICAR, Krishi Bhawan, New Delhi	05.10.96
7.	Dr. P.V. Dehadrai,	DDG (Fish), ICAR Krishi Bhawan, New Delhi	05.10.96
8.	Dr. P. DAs	DDG (Extn), ICAR, Krishi Bhawn, New Delhi	05.10.96
9.	Dr. Mangla Rai	ADG (PP), ICAR, Krishi Bhawn, New Delhi	05.10.96
10.	Dr. R.C. Maheswasri	ADG (CSC), ICAR, Krishi Bhawn, New Delhi	05.10.96
11.	Dr. A. K. Bandopadhyaya	Director, CARI, Andaman & Nicobar, Port Blair	05.10.96
12.	Dr. B.S. Basnet,	Commissioner-cum-Secretary, Agriculture Department Govt. Of Sikkim, Krishi Bhavan , Tadong, Gangtok	05.10.96
13.	Shri S. Lama	Principal Director, Department of Agriculture, Govt. Of Sikkim, Krishi Bhavan, Tadong, Gangtok	05.10.96
14.	Dr. S. P. Ghosh	DDG (Hort), ICAR, Krishi Bhawan, New Delhi.	02.06.96
15.	Team of MP lead by Sri S. K. Gangwar	Member of Parliament on Agriculture Standing Committee No.1 New Delhi	06.06.97
16.	Dr. B. S. Basnet	D.G. Training, Govt. Of Sikkim, Gangtok.	11.11.97
17.	Dr. T.K. Bose	Professor of Horticulture (Rtd.), B.C.K.V. Mohanpur, West Bengal.	

18. Dr. Tej Pratap	Head, Mountain Farming Systems Division, ICIMOD Kathmandu, Nepal	28.11.97
19. Dr. Eklabya Sharma	Scientist Incharge, G.B. Pant Institute of Himalayan Environment Development, Gangtok.	28.11.97
20. G.M. Gurung,	Minister of Agriculture, Govt. Of Sikkim	26.12.97
21. Mr. P. Bhutia,	Secretary, Deptt. of Agriculture, Govt. Of Sikkim	26.12.97
22. Dr. N.K. Dadlani	Sr. Scientist, IARI, New Delhi	20.01.98
23. Dr. P.S Bhatnagar	ADG (VC), ICAR, Krishi Bhawan, New Delhi	18.03.98
24. S.T. Lachungpa	Addl. CCF, Deptt. of Forest, Govt. Of Sikkim.	21.03.98

NOTE: Sl. No. 2 to 12 visited during regional Committee meeting Zone III at Gangtok.



## Executive Summar

The Centre has just completed one and half year of its existence. Most of our initial efforts were focused on infrastructure development and in streamlining the research activities to achieve excellence in research. It was only the early financial year, we have recognised for the National Agricultural Technology Project and a Project on Protectnet. The Director and two Scientists are being acquiring expertise in the areas of Orchids and temperate floriculture in the Himalayan Region, design, development and Production of Orchids for efficient utilization in the National and International trade, collection and evaluation of Orchid species and elite temperate flowers i.e. lillies, Anthurium and Gladiolus has been taken up for their economic importance, generating technologies for improving the productivity of Orchids. Although good technologies will have self replicating ability, creation of awareness among the farmers to work with the Centre is a pre-requisite. Therefore, efforts are being directed for linkages with the performances related to N.G.O. and other Organisations to work with the Centre in extending the benefits of improved technologies to the growers or marginal farmers.

In the History of ICAR, it is the first NRC of floriculture research for reorientation and revalidation of India's large Orchid species to meet the challenges of the next few years which can only be accomplished in carefully planned stages with continuing commitment and support of research workers.

New Initiatives have been taken for following works :

- i) Germplasm collection and evaluation
- ii) Standardisation of potting media for cultivation of Cymbidium Orchids
- iii) Standardisation of foliar nutrient for Orchids
- iv) Standardisation of shade and nutrient doses for Anthuriums and lilliums
- v) Standardisation of package for bulb formation of lilliums
- vi) Standardisation of techniques of Tissue culture for Orchids and Anthuriums
- vii) Standardisation and evaluation of suitable varieties of Gladiolus suitable for cut flower
- viii) Identification of diseases and pests for Orchids, Anthuriums and lilliums
- ix) Protected cultivation of Orchids and Lilliums
- x) Post harvest management of cut flowers.

The above trends will definitely set a new agenda for the generation, assessment and dissemination of floriculture cultivation.

It is needless to mention that steps have been taken to Strengthen national capacity in research and extension management, policy planning, priority setting, monitoring and evaluation to meet current and emerging needs of floriculture cultivation in the country.

It is proposed to upgrade the technique of research in floriculture, taxonomical work may be initiated by eminent Scientists for organisation of vocational training at farm , front-line demonstrations and in service training of field level officials.

## सिक्किम में आर्किड उत्पादन की संभावनाएं

आर्किड प्रकृति में पाये जाने वाले सबसे सुन्दर फूलों में से एक है। इनकी 22000 प्रजातियाँ एवं 700 जातियाँ हैं और फूल वाले पौधों का संभवतः यह सबसे बड़ा कुल है जिसके असंख्य वर्णसंकर और असीम प्रभेद हैं। आर्किड के फूलों की उत्कृष्ट सुन्दरता, चमकीले रंग एवं आकार, सुगन्ध और आकृति की विभिन्नताएं, आकृष्ट करने की विशेषता और प्रकृति में व्यापक रूप से वितरित होने के कारण इन्होंने विश्वभर में अत्याधिक प्रशंसा पायी है। भारत को आर्किड के उद्भव का मूल/द्वितीयक केन्द्र माना जाता है और यहाँ सजावटी आर्किड बहुतायत में पाये जाते हैं; प्रकृति की देन, इस आर्किड सम्पदा, का सही रूप से उपयोग एवं प्रबन्ध अभी हमारे देश में किया जाना है। भारत में, विशेष रूप से उत्तर-पूर्वी क्षेत्र में, अगर इस बहुमूल्य आर्किड सम्पदा का संरक्षण करने के उचित उपाय नहीं किये गये तो इनमें से बहुत सी आर्किड प्रजातियाँ, जो औषधीय, बागवानी या सुन्दरता की दृष्टि से बहुत महत्वपूर्ण हैं, का अस्तित्व समाप्त हो जाएगा। बहुत से विकासात्मक क्रियाकलापों तथा मनुष्य द्वारा स्वार्थवश किये गये संदोहन के कारण अनेकों प्रजातियाँ विलुप्त हो चुकी हैं, कई अन्य विलुप्त होने के कगार पर हैं और बहुत सी इस प्रक्रिया की ओर जा रही हैं।

सिक्किम में आर्किड की 475 प्रजातियाँ तथा 100 जातियाँ पाई जाती हैं। जो यहाँ की गर्म-नम पहाड़ियों से लेकर शीतोष्ण वनों तथा उच्च पर्वत शिखरीय क्षेत्रों में विभिन्न ऊँचाइयों (समुद्र तल से 300 से 4000 मीटर तक ऊँची) पर पायी जाती हैं। सिक्किम की जलवायु एवं स्थलाकृति बहुत सी आर्किड प्रजातियों, विशेष रूप से सिम्बीडियम, की पैदावार के लिए अत्यन्त उपयुक्त है। सिक्किम तथा दार्जिलिङ की पहाड़ियों में सिम्बीडियम वर्णसंकरों का फूलों के व्यवसाय हेतु, उत्पादन की अच्छी संभावनाएं हैं। आजकल आर्किड पौधशालाओं तथा शैकिया आर्किड उगाने वालों के पास सिम्बीडियम के अनेकों वर्णसंकर उपलब्ध हैं। पूर्वी हिमालय क्षेत्र में अप्रैल से अक्टूबर के मध्य होने वाली औसत वर्षा (1500-2000 मि.मी.) और अधिक आर्द्रता (75-97%) के कारण आर्किड का बहुत अच्छा विकास होता है;

सिक्किम तथा दार्जिलिङ पहाड़ियों में आर्किड की खेती सबसे पहले ब्रिटिश अधिकारियों एवं चाय बागानवालों ने शैकियातौर पर शुरू की थी बाद में इन्हीं लोगों ने पचास के दशक में बहुत से वर्णसंकरों को सबसे पहले कालिमपोंग में उगाना शुरू किया। उसी समय में कालिमपोंग से लाकर सिम्बीडियम वर्णसंकरों की खेती सिक्किम में शुरू की गई। पिछले दो दशकों में, विदेशी पौधशालाओं से लाकर, बहुत से सिम्बीडियम, वर्णसंकर तथा कैटेलेयाज आर्किड की खेती यहाँ शुरू की गई हैं। उनके फूलों की, पुष्पसज्जा व्यवसाय में, निर्यात की दृष्टि से प्रबल संभावनाएं हैं। पुष्पसज्जा हेतु फूलों के उत्पादन के लिए, सिम्बीडियम, डेन्ड्रोविअम, वैन्डास कैटेलेयाज पैफिओपैडीलम, फैलिओनाप्सिस, ओन्सीडियम एवं रेनेन्थरा आदि प्रजातियाँ मुख्य रूप से यहाँ उगाई जा रही हैं। अमेरिका, आस्ट्रेलिया, थाईलैण्ड और



सिंगापुर में आर्किड की खेती पौधघरों में की जाती है। अगर 2-3 हैक्टेयर के पौधघर में, नियंत्रित जलवायु परिस्थितियों में, वर्ष भर आर्किड का उत्पादन किया जा सके तो यह व्यवसाय की दृष्टि से बहुत लाभदायक सिद्ध होगा। इन आर्किड फूलों के व्यवसाय के लिए वैज्ञानिक तरीकों पर आधारित उचित योजना एवं बाजार की उपलब्धता अत्यन्त आवश्यक है जो सिक्किम तथा उत्तर-पूर्वी क्षेत्रों में उपलब्ध नहीं हैं। यहाँ जमीनी आर्किड के व्यवसायिक उत्पादन के लिए कम लागत वाले पौधघरों/पॉली हाउस के निर्माण के काम का माननीकरण करना होगा।

अपनी कुछ विशेषताओं, जैसे फूल के लम्बे समय रहने का गुण, एक ही टहनी पर बहुत से फूल एवं रंगों, आकार तथा आकृति की विविधता आदि, के कारण सिम्बीडियम वर्णसंकर पुष्पज्जा के व्यवसाय की दृष्टि से अत्यन्त लाभदायक सिद्ध हो सकते हैं। सिम्बीडियम की टहनी का जीवन पेड़ पर दो महीने तथा फूलदान में तीन सप्ताह से अधिक समय तक होता है। सिक्किम की जलवायु में, सिम्बीडियम वर्णसंकरों का उत्पादन पुष्प सज्जा व्यवसाय के लिए आसानी से कम लागत में किया जा सकता है जो आर्थिक रूप से भी बहुत लाभदायक सिद्ध हो सकता है। आर्किड की खेती और विपणन की सभी सम्भावनाओं पर सरकारी नीतियों एवं वित्तीय सहायता को ध्यान में रखकर विचार करना होगा।

### संवर्धन पद्धतियाँ

आर्किड को विभिन्न प्रकार की जलवायु एवं पर्यावरण परिस्थितियों में उगाया जा सकता है। इनमें से अधिकतर आर्किड जलवायु में पाये जाते हैं जो स्थलीय होते हैं। प्रकृति में आर्किड पेड़ों, चट्टानों, हरे घास के मैदानों या दलदली मैदानों में उगते पाये जाते हैं। इन्हें साधारणतः तीन समूहों में वर्गीकृत किया जा सकता है। स्थलीय आर्किड जमीन पर उगते हैं और इन्हें अन्य पौधों की तरह ही पानी की सामान्य मात्रा की आवश्यकता होती है इन्हें भोजन उनकी मासल जड़ों से प्राप्त होता है जो मिट्टी के अन्दर रहती हैं। सिक्किम की पहाड़ियों में सिम्बीडियम इस प्रकार की खेती के लिए सबसे उपयुक्त आर्किड प्रजाति है। आर्किड की व्यवसायिक खेती में नियन्त्रित संरचनाओं का प्रयोग कर फसल को जलवायु कारकों, जैसे तापमान, प्रकाश, आर्द्रता, हवा और भारी वर्षा आदि, के दुष्प्रभावों से काफी हद तक बचाया जा सकता है। इस प्रकार की सुरक्षात्मक संरचनाएं या पौधघर, स्थानीय परिस्थितियों के अनुसार भिन्न-भिन्न प्रकार के हो सकते हैं। सिक्किम में सिम्बीडियम की व्यवसायिक स्तर की खेती के लिए कम लागत वाले पौलीहाउस प्रयोग किये जा सकते हैं।

### वर्धन विधि

वर्धन केवल जातियों और प्रजातियों के प्रवर्धन के लिए ही आवश्यक नहीं है बल्कि इसके द्वारा बीजों से नये वर्णसंकर भी विकसित किये जा सकते हैं। आर्किड में अधिक उत्पादन के लिए पौधों को प्रवर्धन शाखाओं का वंधन या कलमों द्वारा विकास किया जाता है लेकिन ये तरीके बहुत कम प्रभावी हैं और प्रवर्धन की प्रक्रिया की गति भी काफी कम होती है। वर्तमान में व्यवसाय की दृष्टि से आर्किड का अधिक मात्रा में उत्पादन करने के लिए



उत्तम संवर्धन किया जाता है। बीज द्वारा प्रवर्धन के परिणाम स्वरूप उत्पन्न पौधों में अत्यधिक विभिन्नता पायी जाती है इसीलिए व्यवसाय हेतु वर्णसंकरों को अधिक मात्रा में उत्पादन के लिए उत्तक संवर्धन तकनीकों का प्रयोग किया जाता है। इन विधियों में अलग-अलग प्रजातियों के लिए भिन्न-भिन्न माध्यमों का प्रयोग किया जाता है जिनका मानकीकरण कर लिया जाता है। सिम्बीडियम आर्किड के लिए अधिकतर कडसन 'सी' माध्यम का प्रयोग किया जाता है। साधारणतः जब पौधों की, पत्तियों सहित ऊंचाई, 8-15 मि.मी. हो इनको माध्यम से निकालकर नियन्त्रित संरचनाओं के अन्दर गमलों में लगा देते हैं जिसमें हर एक गमले में लगभग 100 पौधे लगाये जाते हैं। इन गमलों में जब तक पौधे पूरी तरह जम न जाये इनकी अच्छी तरह देखभाल करनी चाहिए। तत्पश्चात छः महीने या एक साल बाद इन पौधों को लगभग 10 पौधे प्रति गमलों के हिसाब से पौध गमलों में स्थानन्तरित कर दिया जाता है और उसके लगभग 6 महीने बाद यह पौधे अलग-अलग गमलों में लगाने के लिए तैयार हो जाते हैं।

पौध लगाने के माध्यम आर्किड के सफल संवर्धन के लिए पौध लगाने की प्रक्रिया सबसे महत्वपूर्ण है। विभिन्न जातियों के लिए पौध लगाने के भिन्न-भिन्न तरीके प्रयोग में लाये जाते हैं। जब फूल आ रहे हों या पौधा कम सक्रिय या निष्क्रिय हों आर्किड के पौधों के साथ छेड़छाड़ नहीं करनी चाहिए। अधिकतर आर्किड जातियों के लिए पौध लगाने का सबसे उपयुक्त समय पुष्पण के बाद का होता है। पौध लगाने या फूल काटने के समय प्रयोग में लाये जाने वाले सभी औजारों को जीवाणुहीन कर लेना चाहिए। स्थलीय आर्किड को साधारणतः सरन्ध्र माध्यम में लगाते हैं। जिसमें दुमट और पर्याप्त मात्रा में कार्बनिक पदार्थ मिले होने चाहिए। आर्किड संवर्धन के लिए माध्यम पौधों की अपेक्षा बिल्कुल भिन्न होते हैं। यह माध्यम, समान रचना वाले ऐसे पदार्थों से बने होने चाहिए जिनमें से पानी का निकास आसानी से हो सके। यह माध्यम बहुत गीला या दलदला न होकर नम होना चाहिए। सिम्बीडियम के लिए सरन्ध्र मिश्रण की आवश्यकता होती है जो दुमट, पेड़ के कटे टुकड़े, फर्न या नारियल के रेशों को समान मात्रा में मिलाकर बनाया जाता है इसके अतिरिक्त अन्य मानकीकृत पदार्थों जैसे कटे हुए फेगनम भौस, धूलरहित छाल पदार्थ, सफेद रेत और भलीभाँति सड़े हुए गोबर या पत्तियों की खाद का भी माध्यम के रूप में प्रयोग किया जा सकता है। ये आर्किड पत्ती की खाद, खुरदरी रेत, ज्वालामुखीय मृदा, दुमट, टूटे चारकोल और टूटे मिट्टी के बर्तनों पर भी उगते हैं।

#### खाद डालना

पौधों में नियमित समय-सारिणी के अनुसार द्रवरूप में उर्वरक देने की प्रक्रिया निश्चित कर लेनी चाहिए। उर्वरक घोल की तनुता तथा उसका कितने बार प्रयोग किया जाना है, आर्किड के जाति तथा पौधों की आयु पर निर्भर करता है। स्थलीय आर्किड पौधों को, पोषकतत्वों की, अधिक मात्रा की नियमित आपूर्ति करनी होती है। पोषक घोल की पी. एच. थोड़ी सी अम्लीय या मध्यम होनी चाहिए। सिक्किम परिस्थितियों में प्रयोग में लाये जाने पोषक तत्वों के घोलों का अनेक शोधकर्त्ताओं या पौधशालाओं द्वारा किया गया में मानकीकरण

प्रयोग किया जा सकता है। जिनका अलग-अलग क्षेत्रों की विभिन्न आर्किड जातियों में प्रयोग किया जा सकता है।

### रोग, कीट एवम् उनका नियन्त्रण

आर्किड पौधों को विभिन्न कीटों, फंफूदी, शाकाणु और विषाणु आदि से होने वाली बीमारियों से बहुत अधिक हानी पहुंचती है। पौधघर की सफाई तथा उचित देखभाल एवं उपयुक्त संवर्धन विधियों द्वारा स्वस्थ पौधों का विकास कर कीटों एवं बीमारियों को दूर रखा जा सकता है। थ्रिप्स, माइट, स्केल कीट, हरी मक्खी, मीलीबग और एफिड आर्किड पौधों को हानी पहुंचाने वाले मुख्य कीट हैं। मिट्टी से पैदा होने वाली समस्याओं से बचने के लिए माध्यम को उचित ढंग से जीवाणुरहित कर लेना चाहिए। कीटों की रोकथाम के लिए पैराथिआन या मैलाथिआन कीटनाशकों का प्रयोग लाभकारी होता है। फंफूदी से उत्पन्न रोग जैसे ब्स्मेक रॉट, एन्धेक्नोज, सूटी मोल्ड, हर्ड रॉट, लीफ स्पॉट या लीफ ब्लाउट आदि आर्किड पौधों को मुख्य रूप से हानि पहुंचाते हैं। काँपर फुफूदीनाशक या व्यापक प्रभाव वाले फंफूदीनाशकों के प्रयोग से इन बीमारियों को नियंत्रित कर सकते हैं। साँफ्ट रॉट या बैक्टीरिअल ब्राउन स्पॉट आर्किड की प्रभावित करने वाली गम्भीर बीमारियाँ हैं जिन्हें मरक्यूरिक क्लोराइड के प्रयोग से नियंत्रित किया जा सकता है। कुछ विषाणु जनित बीमारियाँ भी आर्किड पौधों को हानि पहुंचाती पायी गई हैं जिनको रोकथाम के गम्भीर उपाय करने का आवश्यकता है।

सिक्किम में आर्किड उगाने की सबसे बड़ी समस्या चुनिंदा क्लोन्स के अच्छे दर्जे के बड़ी मात्रा में उपलब्धता है। सिम्बीडियम आर्किड फूलों के व्यवसाय को अच्छी तरह चलाने के लिए हर महीने लगभग 10000 फूलों का उत्पादन होना चाहिए जिससे उन्हें व्यवसायिक केन्द्रों तक ले जाया जा सके। आर्किड उत्पादन के व्यवसाय में अधिक व्यय होने के साथ-साथ जोखिम भी बहुत होता है। इस व्यवसाय से जुड़ी कुछ अन्य मुख्य समस्याएं निम्नलिखित हैं:-

#### समस्यायें

1. फूल आने में काफी समय लगना
2. शुरुआत करने के समय और रखरखाव में अधिक व्यय
3. कृषि तकनीकों एवं शोध-सूचनाओं का अभाव
4. पुष्प सज्जा व्यवसाय के लिए आर्थिक रूप से लाभकारी पौधों का उपलब्ध न होना
5. आय-व्यय अनुपात संबंधी सूचनाओं का अभाव
6. पुष्प सज्जा व्यवसाय हेतु आर्किड फूलों के लिए बाजार उपलब्ध न होना
7. बाजार भेजने के लिए भराई के सामान व यातायात की अधिक कीमतें
8. उत्पादकों के लिए उधार या ऋण सुविधाएं उपलब्ध न होना
9. सरकारी नीतियों एवं बाजार संबंधी सूचनाओं का अभाव।

सिक्किम में आर्किड उगाने की सम्भावनायें

1. जलवायु सम्बन्धी उपयुक्त परिस्थितियाँ
2. उगाने के लिए सीमित स्थान की आवश्यकता
3. लम्बे समय तक नियमित आय
4. घरेलू बाजार की उपलब्धता एवं निर्यात की माँग।

आर्किड के निर्यात की अच्छी संभावनाओं एवं सीमित शोध सहायता को ध्यान में रखते हुए भारतीय कृषि अनुसंधान परिषद् ने पाक्योंग में राष्ट्रीय आर्किड अनुसंधान केन्द्र की स्थापना निम्नलिखित उद्देश्यों से की:-

1. अनुवांशिक संसाधनों को समृद्ध करने के लिए विदेशी एवं व्यवसाय सयोग्य प्रजातियों और वर्णसंकरों का समावेश, अंतर्राष्ट्रीय जननद्रव्य का भंडारण, उनका मूल्यांकन और अंतर्राष्ट्रीय व्यापार हेतु वर्णसंकर विकसित करने के लिए प्रजनन में उनका प्रयोग।
2. राष्ट्रीय और अंतर्राष्ट्रीय व्यापार के लिए उच्चकोटि की प्रजातियाँ एवं वर्णसंकर विकसित करने के लिए योजनाबद्ध प्रजनन कार्यक्रम।
3. चुनिन्दा वर्णसंकरों के अधिक उत्पादन के लिए प्रजनन तकनीकों (इन-विट्रो) का मानकीकरण।
4. आर्किड की व्यवसायिक खेती के लिए शीघ्र एवं समान आकार के बड़े फूल प्राप्त करने के लिए कृषि-तकनीकों का मानकीकरण।
5. कटाई के बाद पुष्पसज्जा हेतु फूलों के व्यवसाय के लिए उचित पद्धतियों का मानकीकरण।
6. व्यवसायिक आर्किडों की पैदावार, विकास और पुष्पण पर शोधकार्य।
7. बहुगुणिता (पॉली प्लाइडी) के समावेश से फूलों के आकार और बढ़ोतरी तथा ब्रन्ध वर्णसंकरों में प्रजनन क्षमता को पुर्नस्थापित करने पर शोधकार्य करना।
8. वैज्ञानिक एवं तकनीकी सूचनाओं का प्रलेखन एवं प्रसार तथा प्रशिक्षण कार्यक्रमों का आयोजन करना।



सिक्किम में आर्किड उगाने की सम्भावनायें

1. जलवायु सम्बन्धी उपयुक्त परिस्थितियाँ
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4. घरेलू बाजार की उपलब्धता एवं निर्यात की माँग।

आर्किड के निर्यात की अच्छी संभावनाओं एवं सीमित शोध सहायता को ध्यान में रखते हुए भारतीय कृषि अनुसंधान परिषद् ने पाक्योंग में राष्ट्रीय आर्किड अनुसंधान केन्द्र की स्थापना निम्नलिखित उद्देश्यों से की:-

1. अनुवांशिक संसाधनों को समृद्ध करने के लिए विदेशज एवं व्यवसाय सयोग्य प्रजातियों और वर्णसंकरों का समावेश, अंतर्राष्ट्रीय जननद्रव्य का भंडारण, उनका मूल्यांकन और अंतर्राष्ट्रीय व्यापार हेतु वर्णसंकर विकसित करने के लिए प्रजनन में उनका प्रयोग।
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4. आर्किड की व्यवसायिक खेती के लिए शीघ्र एवं समान आकार के बड़े फूल प्राप्त करने के लिए कृषि-तकनीकों का मानकीकरण।
5. कटाई के बाद पुष्पसज्जा हेतु फूलों के व्यवसाय के लिए उचित पद्धतियों का मानकीकरण।
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8. वैज्ञानिक एवं तकनीकी सूचनाओं का प्रलेखन एवं प्रसार तथा प्रशिक्षण कार्यक्रमों का आयोजन करना।





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**STATE FLOWER OF SIKKIM**



*Dendrobium nobile*

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