

# Orchids

## Newsletter



राष्ट्रीय आर्किड अनुसंधान केन्द्र  
(भारतीय कृषि अनुसंधान परिषद्)  
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### Congratulation to Dr. N. K. Krishna Kumar

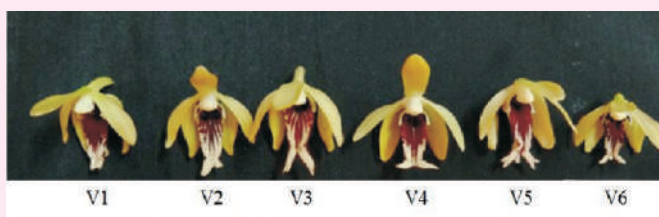
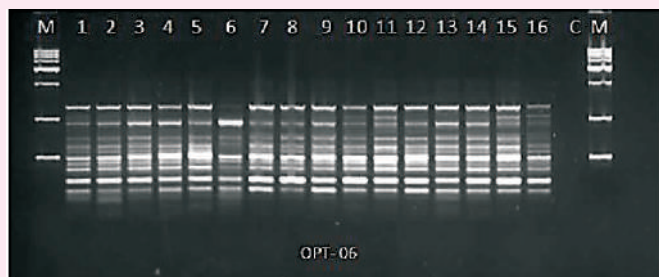


Hearty welcome and congratulations to Dr. N. K. Krishna Kumar, the new Deputy Director General (Horticulture), ICAR, New Delhi. Dr. Krishna Kumar, joined office as DDG (Hort.), ICAR, New Delhi on 9<sup>th</sup> August, 2012. He started his career as Scientist and elevated to Head, Department of Agricultural Entomology, IIHR, Bangaluru where he worked for more than two decades and later as Director at NBAIL, Bangaluru. Dr. Krishna Kumar did his Ph.D. and Post-Doctoral Fellow in USA. He is an eminent, renowned entomologist in the country, particularly in the field of entomological research in vegetables. He had 34 years of professional experience and published more than 120 research papers in both National and International journals. Dr. Krishna Kumar had visited several countries. He is also an active member of several professional societies viz. President – Association for Pest Management in Horticultural Ecosystem; Vice-President – Society for Promotion of Horticulture and Founder Member of Entomology Academy of India. Dr. Krishna Kumar was instrumental in transferring many ICAR technologies to entrepreneurs through commercialization. The Director and staff of NRCO wish him a great success in his future endeavors and hopes that Indian Horticulture will attain new heights under his visionary guidance and able leadership.

## RESEARCH HIGHLIGHTS

### Intra specific variability analysis of *Vanda cristata* by using RAPD markers

*Vanda cristata* is an important species of the genus *Vanda* which has been used as parent materials for developing many hybrids having high commercial value. Intra species floral variability was observed in *Vanda cristata* in the orchid house of NRC for Orchids. To study the genetic variability RAPD analysis was performed using 37 decamer primers which produced distinct bands. A total of 351 bands generated by the primers of which 14.24 % i.e. 50 were monomorphic and 85.76 % i.e. 301 were polymorphic in nature. Huge percentage of polymorphic bands indicates genetic variability within the species. RAPD analysis can be applied for determination of intra species genetic variation in Orchids.



### Molecular variation and relationship among all native *Vanda* species of India using ISSR markers

Genetic diversity and relatedness of 18 native species of genus *Vanda* were analysed using Inter Simple Sequence Repeats DNA (ISSR) markers. 20 ISSR primers had amplified total 1349 loci and

produced 443 total bands. Among the bands 0.46% i.e. 2 were monomorphic and 99.54% i.e. 441 were polymorphic in nature. Huge percentage of polymorphic bands self-states the genetic diversity in genus *Vanda*. Cluster analysis of all the genotypes was performed using NTSYS software. Maximum genetic similarity i.e. 76.99 % was recorded between *Vanda cristata* and *Vanda cristata* var. *multiflora* and minimum similarity 4.8% was seen between *Vanda pumila* and *Vanda parishii*. A Phylogenetic tree was prepared by using data generated by ISSR scoring and the tree grouped all the species in to major clusters C1 and C2 and one single species *Vanda spathulata* was separated as outlier. In major cluster C1, 7 species were grouped whereas in cluster C2, 10 species were grouped. The major clusters were sub divided into four minor clusters MC1, MC2, MC3 and MC4. Cluster C1 had 2 minor clusters named MC1 and MC2. In minor cluster MC1, *Vanda alpina*, *Vanda Cristata*, *Vanda cristata* var *multiflora*, *Vanda griffithi* and *Vanda pumila* were grouped and in MC2 *Vanda thwaitesii* and *Vanda weightii* were grouped. The minor cluster MC3 again divided into two sub clusters SC1 and SC2 and one species like *Vanda amesiana* was outlier in minor cluster. *Vanda parishii*, *Vanda testecea*, *Vanda stangeana* and *Vanda roxburghii* were grouped in SC1 and terete leaved *Vandas*, i.e. *Vanda teres* and *Vanda teres* var *candida* were grouped in SC2. In minor cluster MC4 *Vanda bicolor*, *Vanda coerulea* and *Vanda coerulescens* were laid. The study conclude that, species having same floral characters were grouped in same cluster and ISSR primers were helpful for to differentiate closely related species or even clonal individuals.



### Early and mid flowering breeding variety (PBX-05-29/2012-3 & 4) of *Cymbidium* for Sikkim

The early and mid flowering varieties of *Cymbidium* are desirable in Sikkim considering market potential. In Sikkim, the introduced varieties for early flowering are more over outdated material. The huge demand for early and thermo tolerant varieties exist for *Cymbidiums*. The cross of *Cymbidium* 'Red Beauty' x *Cymbidium* 'Golden Elf' (PBX-05-29) flowered during 2012 is found promising. The early flowering during September (4<sup>th</sup> WK) was observed for PBX-05-29-2012-2 and mid flowering during January (2<sup>nd</sup> WK) observed in the same F<sub>1</sub> progeny (PBX-05-29-2012-4) with attractive flower colours. The range of variation for sepal – petal colour and differential flowering was observed for the same cross.



*Cymbidium* 'Red Beauty' x *Cymbidium* 'Golden Elf' (PBX-05-29-2012-2)



*Cymbidium* 'Red Beauty' x *Cymbidium* 'Golden Elf' (PBX-05-29-2012-4)

### Achievement of first record (In India) on *in-vitro* flowering in *Cymbidium*

The *in-vitro* flowering plantlets were about 6-10 cm height was achieved for the first time in India at NRC for Orchids, Pakyong (Sikkim). Each flowering plantlet with 3 to 5 leaves produced one inflorescence stalk with an average of 1-2 flower buds with flower size of 2 x 2.5 cm was developed in *Cymbidium dayanum*. The flowers observed with petals and sepals are clear with a reddish purple column and whitish yellow anther. Seventy per cent of the flowering plantlets produced a single flower; while the remaining produced double flowers. The flowers produced by *in-vitro* flowering of *Cymbidium dayanum* were smaller than the normal flowers with flowering duration of 15 to 20 days. Shortening of juvenile period can provide a model system for studying flowering initiation and development. Conventional orchid breeding is a lengthy process but through *in-vitro* flowering technique we can obtain flowers within a short period of time which allows earlier assessment of certain desired characteristics of the flowers such as size, shape, tones and variations of colours.



*In-vitro* flower of *Cymbidium dayanum*

### New inventive hybrids of *Cymbidium* flowered at NRCO (2012)

Due to non-availability of modern hybrids in India, the large scale imports were made with higher investments. These imported hybrids are 15 to 16<sup>th</sup>

generations developed by Japan and US. Even though, the initial performance of imported hybrids is good, their performance was degraded in course of time, mainly due to varietal vulnerability and their lesser chances for better adaptation to the local conditions. However, the varieties developed from native gene pool (indigenous species) adapts to local conditions (G x E) and performs well with free from pests and diseases. History recorded the genetic contribution of species from Sikkim for the development of modern *Cymbidium* hybrids by Europeans (ex: *Cymbidium lowianum*).

Re-Invention of breeding cycle (2012): In the year 2012, once again the breeding cycle is re-invented in India after the flowering of primary hybrid of **first indigenous cross**, PBX-05-56/2012 (*C. lowianum* x *C. tigrinum*). Four new varieties were identified from the flowering F<sub>1</sub> progeny (clones) and selected for commercialization and further improvement. The new *Cymbidium* varieties characterized are viz., PBX-05-29/2012-02 (*C. 'Golden Elf'* x *C. 'Red Beauty'*), PBX-05-10/2012 (*C. 'Fency Free'* x *C. 'Tetraploid Oklahama'*), PBX-05-34/2012 (*C. 'Red Star'* x *C. 'Fency Free'*) and PBX-05-884/2012 (*C. 'Show Girl'* x *C. 'Red Star'*) etc.



*Cym. 'Golden Elf' x cym. 'Red Beauty' (PBX-05-29/2012-02)*



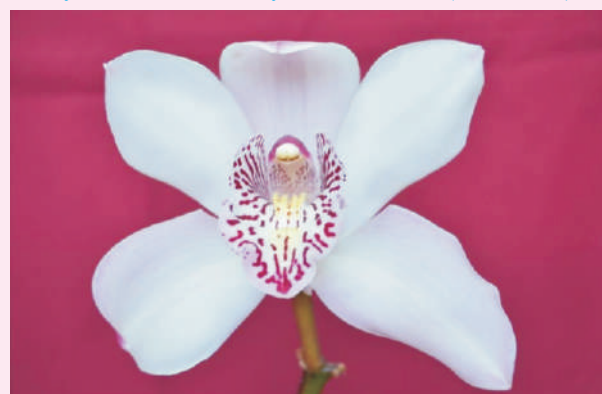
*Cym. 'Show Girl' x Cym. 'Red Star' (PBX-05-884/2012-02)*



*Cym. Lowianum x Cym. 'Show Girl' (HxB/2012)*



*Cym. 'Show Girl' x Cym. 'Red Star' (PBX-05-884/2012-01)*



*Cym. 'Fency Free' x Cym. 'Tetraploid Oklahama' (PBX-05-10/2012)*



*Cymbidium lowianum* x *Cymbidium tigrinum*  
(PBX-05-56/2012-1)

### **Cymbidium based integrated floriculture**

Cost benefit ratio of *Cymbidium* based integrated floriculture enterprise were worked out. The Cost benefit ratio of this integrated approach is 1.80. The cumulative cost benefit ratio may vary in future depending on the production and market price of the *Cymbidium*.

### **Growing of scented orchids**

*Coelogyne nitida* a scented and epiphytic orchid abundantly found in Sikkim can be grown effectively as house plant in pot and hanging basket or wooden log. It was found that growing of *Coelogyne nitida* in wooden log produce more number of spike along with larger size of flowers.



*Coelogyne nitida* in Wooden Log



*Coelogyne nitida* in Pot

### **Antioxidant activity of orchids**

Antioxidants have been reported to prevent oxidative damage caused by free radical and can be used in cardiovascular and anti-inflammatory diseases. Methanolic extract from stems and leaves of *Aerides odoratum* and *Acampe papillosa* were evaluated for their total polyphenol, total flavonoid and antioxidant properties. Major amount of phenols and flavonoids were determined in stem of *Aerides odoratum* followed by stem of *Acampe papillosa*. High radical scavenging activity was observed in the stem of *Aerides odoratum*. Hence this can be a potential species with high antioxidant activities and more research work should be carried out in terms of characterization and evaluation of secondary metabolites

### **Indexing of Phalaenopsis, Vanilla and Vanda hybrids for CymMV and ORSV**

10 *Phalaenopsis* hybrids brought from Kerala to NRC (O) for their performance under the climatic condition of Sikkim. All the hybrids were indexed for CymMV and ORSV in DAS - ELISA test using the antibodies from Agdia Incorporation, USA. ELISA results showed that hybrid Ox Prince thunder, Hsin Ying Fortune, Shu Shu Long 1<sup>st</sup> love and Kaleidoscope were infected with CymMV while Taida S Red, Ox Prince Thunder, Strawberry, Makhi Wantanabe, Memoria Francis Hunter, Ox Plum Rose

X Ox Black Jack were having very high concentration of ORSV. Only one hybrid, 748 Chain Xen Magpie was found free from viruses. In addition to this, two samples of *Vanilla* and 14 *Vanda* hybrids were also checked for viruses. Out of two samples of *Vanilla*, only one sample was found infected with CymMV while five hybrids of *Vanda* were found infected with these viruses. This shows that CymMV and ORSV are most prevalent viruses on orchids particularly on hybrids.

### Characterization and management of black spot disease of *Aranda*, *Mokara*, *Cattleya* and *Oncidium* hybrids

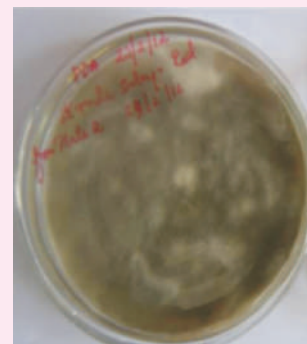
Hybrids of *Aranda*, *Mokara*, *Cattleya* and *Oncidium* imported from Thailand in 2008-09 to evaluate their performance in Indian condition to exploit them for commercial cultivation. These hybrids were maintained in polyhouse in NRCO. Majority of the hybrids were infected with a black spot disease on leaves and stems. The incidence of the disease is ranging from 33 to 100%. The pathogen was identified as *Pestalotia disseminata* (I.D. No. 8657.12, ITCC). The cultural character of the pathogen was observed as light grey coloured mycelium which subsequently turned dark grey. The profuse mycelial growth was observed in  $25^{\circ}\text{C} \pm 2$ . Conidia are multi-celled with usually three darkly pigmented center cells and clear pointed end cells. Conidia are ellipsoid which has two whisker-like appendages arising from the end cell.

**Management :** *In vitro* screening of fungicides was done against *P. disseminata* by poisoned food technique to access the efficacy of fungicides viz: Mancozeb (75% WP), Copper Oxychloride 50% WP, Carbendazim 50% WP and Matalaxy1 8% + Mancozeb 64% WP under different concentrations like 100 ppm, 200 ppm, 300 ppm, 500 ppm and 1000 ppm. Mancozeb (75 % WP) showed 100%

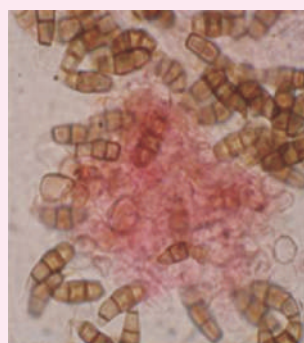
inhibition of mycelial growth in vitro of *Mokara* and *Aranda* leaf blight fungus even at 100 ppm concentrations.



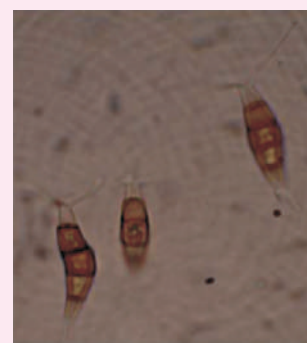
Black spot symptoms on *Aranda* hybrid



Greycolour mycelia growth of *Pestalotia disseminata* PDA



Four celled conidiophores



Conidia of *Pestalotia disseminata* showing two appendages from apical cell.

### Evaluation of biopesticides for the management of aphid on *Dendrobium nobile*

A field experiment was conducted to evaluate the relative efficacy of botanical products and biopesticides against aphid on *Dendrobium nobile* under polyhouse conditions. Nine treatments (including control) viz., azadirachtin (neem oil) 0.03%EC 5ml/lit., econeem 3000 ppm 2ml/lit., garlic extract 5%, chilaune leaf extract 10%, datura leaf extract 10%, titapat leaf extract 10%, tobacco extract 5% and cow urine were applied at 10 days intervals. The results showed that, all the treatments were found significantly superior over control. The highest mortality (78.06%) occurred on the plants treated with econeem followed by neem oil, whereas, minimum on titapat extract. The remaining

treatments were found moderately effective against aphid.

### Relative efficacy of bio-pesticidal based IPM modules against boisduval scale on *Cymbidium*

An experiment was conducted to evaluate the relative efficacy of different treatments as IPM modules against boisduval scale, *Diaspis boisduvali* on *Cymbidium* under polyhouse conditions. The seven IPM modules consisting physical and cultural practices, biopesticides and chemicals (M1- sanitation, neem guard 2.5 ml/lit, tobacco extract 5%; M2- sanitation, garlic extract 5%, monocrotophos 2ml/lit; M3- tobacco extract 5%, neem oil 5 ml/lit, fipronil 2 ml/lit; M4- Nirma solution 3gm/lit, econeem 2ml/lit, imidacloprid 0.003%; M5- datura leaf extract 10%, NSKE (achook) 5 ml/lit, profenofos 1.5 ml/lit; M6- chilaune leaf extract 10%, neem oil 5ml/lit, cow urine 50%; M7- titapat leaf extract 10% forced water treatment, bifenthrin 0.025%. Results showed that all treatment reduced scale infestation in comparison to control, however, the maximum mortality (92.55%) was found on the plants treated with module M4.

### Preparation of DUS Test Guidelines in Commercial Orchids

According to UPOV Convention 1961, DUS testing is essential to provide and promote an effective system of plant variety protection, with the aim of encouraging the development of new varieties of plants and for the benefit of society. It provides rights for breeders to exploit or develop new plant varieties, to allow access to foreign varieties with widen gene pool, to promote intensive breeding activities and to prevent unauthorized varieties exploitations.

### DUS testing in *Cymbidium* orchids

16 species and 41 hybrids of *Cymbidium* were included for development of DUS test guidelines with 66 common descriptors. In *Cymbidium*, out of 66 characteristics, pseudobulb shape, inflorescence length, number of flowers, flower width, flower length, flower duration, flower predominant color, lip ornamentation and blooming time were considered as grouping characters of species and hybrids

**Table1: Pseudobulb shape in *Cymbidium***

States	Example species/varieties
Narrow cylindrical	
Round	<i>Cym. dayanum</i> , <i>Cym. gammieanum</i> , <i>Cym. tigrinum</i> Cym. 'Lucky Rainbow'.
Ovoid	<i>Cym. pendulum</i> , <i>Cym. elegans</i> , <i>Cym. hookerianum</i> , <i>Cym. erythraeum</i> , <i>Cym. tracyanum</i> , <i>Cym. aloifolium</i> , <i>Cym. irridioides</i> Cym. 'Soul Hunt ', Cym. 'Fire Storm', Cym. Bob Marlin 'Lucky', Cym. 'Winter Beach Sea Green', Cym. 'Madrid Forest King', Cym. 'Show Girl', Cym. 'Sleeping Nymph'
Conical	<i>Cym. elegans</i> , Cym. 'Luna Pink',

### DUS testing in *Dendrobium* orchids

30 species and 14 hybrids of *Dendrobium* were included for development of DUS test guidelines with 52 common descriptors. In *Dendrobium*, out of 52 characteristics, plant height, internode length and number, inflorescence length, flower width, lip colour, and ornamentation and flowering time were used as grouping characters of species and hybrids.



1

Cane (woody)



3

Cane cylindric (fleshy)



5  
Cane clavate fleshy



7  
Bulbous (round)

### DUS testing in *Vanda* orchids

12 species and 9 hybrids of *Vanda*, were included for development of DUS test guidelines with 54 common descriptors. Out of 54 characteristics, leaf type, inflorescence length, flower number, inflorescence colour, sepal and petal colour pattern, lip shape, colour and ornamentation, spur length and flowering time were used as grouping characters of species and hybrids.

**Table 2: Leaf type in *Vanda***

States	Example species/varieties
Narrow cylindrical	
Terete	<i>Vanda teres</i> , V. 'John Clubb' V. 'Miss Joaquim'
Semi-terete	V. Emma van Deventer, V. Ruby
Channelled	<i>Vanda sanderiana</i> , <i>Vanda lamellata</i>

These test guidelines of *Cymbidium*, *Dendrobium* and *Vanda* were developed by the National Core Committee in consultation with the Nodal Officer, DUS test centre, NRC for Orchids, Pakyong, Sikkim and Task Force (8 / 2009) constituted by the PPV & FRA Authority. These three species have been notified for registration at Protection of Plant Variety & Farmers Right Authority under the Act from March, 27, 2012 onwards and the application for registration of extant varieties of the above mentioned crop species will be accepted up to March, 26, 2015.

## INSTITUTIONAL ACTIVITIES



Independence Day Celebration



Drawing Competition during Independence Day



Cultural Programmes during Independence Day





Celebration of Hindi Saptah  
(14 – 20<sup>th</sup> September, 2012)



Model Training Course on 'Conservation of Orchids'  
(19 – 26<sup>th</sup> September, 2012)



Raising Day Celebration  
(5<sup>th</sup> October, 2012)



Model Training Course on 'IPM on Floriculture'  
(26<sup>th</sup> Nov., – 3<sup>rd</sup> Dec., 2012)



National Integration week  
(19<sup>th</sup> November, 2012)

## The 11<sup>th</sup> Institute Research Committee meeting

The 11<sup>th</sup> Institute Research Council meeting of NRC for orchids, Pakyong, Sikkim-737 106 was held on 12<sup>th</sup> July, 2012 under the Chairmanship of Director, Dr. R. P. Medhi at the Conference Hall of the Institute. other members that were present in the meeting are Dr.V.A.Parthasarathy, Hon'ble member,RAC; Sh.Padam Subba, Deputy .Director, HCCD, Govt. of Sikkim; Smt. Anuradha Chettri, Farmers Representatives ,Kartok, Pakyong; Smt. Ranmaya Gurung, Farmers Representatives, Yangang, South Sikkim; Smt. Namita Rai, Farmers

Representatives, Yangang, South Sikkim apart from that all the scientists from NRC for orchids, Pakyong and Darjeeling campus were also present in the meeting.

### **Participation of Scientists in Conference, Meetings, Workshop, Symposia, Seminar etc in India and Abroad.**

5<sup>th</sup> Indian Horticulture Congress, 2012 at PAU, Ludhiana from 6-9<sup>th</sup> Nov, 2012.

L. C. De

Mid Term Performance of RFD Meeting (2012-13) at KAB-II, Pusa, New Delhi from 23<sup>rd</sup> November, 2012.

L. C. De

2<sup>nd</sup> Meeting of Orchid Task Force for preparation of DUS test guidelines in *Phalaenopsis* and *Cattleya* at KAU, Thrissur, Kerala from 21<sup>st</sup> -22<sup>nd</sup> August, 2012.

L. C. De

Final Meeting of Orchid Task Force for preparation of DUS test guidelines in *Phalaenopsis* and *Cattleya* at PPV & FRA, NASC Complex, New Delhi from 31<sup>st</sup> Oct., -1<sup>st</sup> Nov., 2012.

L. C. De

Review Workshop of PME Cell at NDRI, Karnal on 8<sup>th</sup> December, 2012.

L. C. De

### **Education and Training**

Five days winter training programme on 'MDP in Agricultural Research' at NAARM, Rajendernagar, Hyderabad from 3<sup>rd</sup>-7<sup>th</sup> December, 2012.

D. Barman, L. C. De

### **Distinguished Visitors:**

1. Dr. V. A. Parthasarathy, Emeritus Scientist, IISR, Calicut - 12/07/2012
2. Dr. Jagmohan Singh, Former VC, Dr. Y. S. Parmar University of Horticulture & Forestry, Solan & QRT- Floriculture, AICRP & HPU Planning (ICAR) - 02/08/2012
3. Prof. P. Das, FNA, Chairman, The Science Foundation for Tribal & Rural Resource Development, Bhubaneswar, Odisha - 05/10/2012

### **Publications**

#### **Books**

1. Meena., N. K., R. P. Medhi and Rampal. 2012. *Orchids: Predhashya Avann Uttapadan Prodhaugiki*. National Research Centre for Orchids, Pakyong, Sikkim, Pp. 1 -216.

#### **Book Chapters**

1. De., L. C., 2012. Orchid Garden. In: *Handbook of Gardening*. Aavishkar publishers & Distributors, Jaipur, Rajasthan. Pp: 178.
2. Meena., N. K. and R. P. Medhi. 2012. Bio-rational Pests Management in Floricultural Crops. *Biotechnological and Bio-rational Approaches for Pests and Disease Management*. Biotech Books Publisher, New Delhi, Pp: 346-379.

### **Pamphlet/ Folder**

1. Barman., D., Rampal, V. Shalini, H. Pokhrel and R. P. Medhi. *Fragrant Orchids*. (English,

Hindi, Nepali)

2. Barman., D., Rampal, V. Shalini, H. Pokhrel and R. P. Medhi. *Production technology for Dendrobium chrysanthemum* (English, Hindi, Nepali)

### Research Papers:

1. Chowdappa., P., C. S. Chethana, R. Bharghavi, H. Sandhya and R. P. Pant, 2012. *Morphological and molecular characterization of Colletotrichum gloeosporioides (Penz.) isolates causing anthracnose of orchids in India. Biotechnol. Bioinf. Bioeng.* 2 (1): 567-572.
2. Meena., N. K., Ram Pal, R. P. Pant and R. P. Medhi. 2012. Evaluation of insecticides and biopesticides for the management of two spotted spider mite, *Tetranychus urticae* in orchid (*Cymbidium* H. C. Aurora). *Pestology*, **36(10)**: 40-45.
3. Rao., A. N., P. K. Rajeevan, Manoj Srivastava, S. R. Dhiman and L.C. De. 2012. Guidelines for the Conduct of Test for Distinctiveness, Uniformity and Stability on Orchid *Cattleya* and *Phalaenopsis* orchids. *Plant Variety J. of India*, **6(11)**: 7-116.

### Popular articles

1. Chakrabarti, Syamali., Sudeep Jain and R. P. Medhi. 2012. Khane jogya Orchids. *Phal Phool*.
2. Chakrabarti., Syamali., Sudeep Jain and R. P. Medhi. 2012. Vanilla-maslo ke rup me upgyog me anewala ek mulyaban orchid. *Phal Phool*, November-December.

3. Chowdappa, P., Chethana, C.S., Bharghavi, R., Sandhya, H. and Pant, R.P. (2012) Morphological and molecular characterization of *Colletotrichum gloeosporioides* (Penz.) isolates causing anthracnose of orchids in India. *Biotechnol. Bioinf. Bioeng.* **2(1)**: 567-572.

3. R. P. Medhi and L.C. De. 2012. NRC for Orchids. In: '*Farmer Friendly Technologies in Horticulture*' 5<sup>th</sup> IHC from 6-9<sup>th</sup> Nov., 2012, PAU, Ludhiana.

### Bulletin

#### Paper presented in Seminars/Symposia:

1. De., L. C., S. P. Vij and R.P. Medhi. 2012. Post-harvest Technology of Cymbidium Orchids. In: *Proceedings of 5<sup>th</sup> IHC* from 6-9<sup>th</sup> November, 2012 at PAU, Ludhiana, Punjab.
2. De., L. C., S. P. Vij and R.P. Medhi. 2012. Impact of climate change on productivity of orchids. In: *Proceedings of 5<sup>th</sup> IHC* from 6-9<sup>th</sup> November, 2012 at PAU, Ludhiana, Punjab.
3. Medhi., R. P. and M. Chakraborti. 2012. Floriculture development in North Eastern India: challenges, prospects and success stories. Pp:41-48. In: *State level workshop on 'Bridging Research to Extension: Strategies & Policies'* at Gangtok on October 11, 2012 organized by ICAR Research complex for NEH Region, Sikkim Centre, Sikkim.
4. Medhi., R. P. and Rampal. 2012. Modern methods for conservation of orchid germplasm. In: *Souvenir cum Abstract*

Book, *National Seminar on 'Innovative Technology for Conservation and Sustainable Utilization of Island Biodiversity'* from 20-22<sup>nd</sup> December, 2012 at CARI, Port Blair.

5. Medhi., R. P. and Rampal. 2012. Promoting Orchid Cultivation for Better Livelihood Security and Prosperity of North Eastern States of India. In: *Souvenir cum Abstract Book, National Seminar on 'Innovative Technology for Conservation and Sustainable Utilization of Island Biodiversity'* from 20-22<sup>nd</sup> December, 2012 at CARI, Port Blair.
6. Pattanayak., S. L., D. Barman, R. Devadas and R. P. Medhi. 2012. Mass multiplication of *Cymbidium* hybrid 'Baltic Glacier Mint Ice' through shoot tip culture. Pp: 14-15. In: *5<sup>th</sup> Indian Horticulture Congress, An International Meet – Celebrating 70 years of Establishment of HIS from 6-9<sup>th</sup> November, 2012 at Ludhiana, Punjab.*

## **Awards/Rewards/Recognition/Bodies acquired during the reported period**

1. Dr. L. C. De, Pr. Scientist (Horticulture) received the HSI Gold Medal award for his contribution in the field of floriculture from Horticulture Science Congress. He also received the best poster award on 'Postharvest technology of *Cymbidium* Orchid' at the meet from 6-9<sup>th</sup> November, 2012 at Ludhiana, Punjab.
2. Dr. D. Barman, Pr. Scientist (Horticulture) received the Fellow award, Ornamental Soc. of India, 2011-2012 at New Delhi.

## **Appointments**

### **Administration**

Shri. Arvind Chauhaan joined as assistant on 27<sup>th</sup> September, 2012.

### **Published by**

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### **Editorial Committee**

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