



# NEWSLETTER

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### About the Newsletter

The National Research Centre for Medicinal & Aromatic Plants (NRCMAP) is one of the institutes of the Indian Council of Agricultural Research (ICAR). NRCMAP's mission is to conduct research on all aspects of improvement, production and utilization of medicinal and aromatic crops. It also supports and is engaged in activities of multilocational testing of technologies through its out reach organ, All India Networking Research Project on Medicinal & Aromatic Plants (AINRPMAP).

AINRPMAP works in partnership with State Agricultural Universities and other organizations, undertakes research, multilocation testing of technologies, training and provides scientific and technical advice and information to a host of clients such as farmers and growers, industries, etc.

This newsletter is published half yearly to promote overall concern on medicinal and aromatic plants with emphasis on their conservation and production technology. It provides information, mainly generated in NRCMAP and AINRPMAP.

### Inauguration of Residential Complex of NRCMAP



Residential complex of NRCMAP was inaugurated by Dr. Mangala Rai, DG, ICAR & Secretary, DARE on 14<sup>th</sup> March. In a formal function which followed the inauguration Dr. S. Maiti, Director, NRCMAP welcomed all the dignitaries. Dr. J. S. Samra, DDG, Natural Resource Management, ICAR expressed that the facility created would be helpful for the staff members to serve the nation better. Dr. Mangala Rai congratulated the members of NRCMAP family for getting the residential facility in a beautiful location flanked by basic utilities and recreation centre. He expected that with the creation of such facility the

performance of the staff members would increase. He categorically emphasised that ICAR does not have any hesitation to create more infrastructure if that helps in accelerated output of the institute. He reminded that ICAR is trying to create an environment where performance of its staff would be rewarded in economic terms. Major share of the revenue generated from each intellectual property would be given to the persons involved in the development of the same. He reminded that medicinal and aromatic plants has immense opportunity in terms of identification of active molecules

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## EDITORIAL

*The use of plants for preparations of medicines and health care is by and large the biggest use of plants in terms of the number of species specifically targeted. Plants provide the predominant ingredients of medicines used in most traditional systems of healing and also have been the source of inspiration for several major pharmaceutical drugs development.*

*The scale of trade in MAPs ranges from local to international. Much of the trade is unrecorded or poorly documented in official statistics due to the poor documentation. Also decision makers usually have little awareness about the significance of trade and consumption of medicinal plants. Even, the problems associated with wild collection in terms of un-sustainability and harmful impacts on natural habitats are not fully understood.*

*According to the International Standard for the Sustainable Wild Collection of Medicinal and Aromatic Plants (ISSC-MAP), the main threats for the MAP populations are over-harvesting and habitat loss, through land conversion. Therefore, best practice for the conservation and sustainable use of medicinal plants would be to identify and promote conservation and cultivation of vulnerable species through relevant policy change. To achieve the goal, development of models with protocols for plant conservation and sustainable use, based on research and practical experience should get priority.*

*Europe has come out with an exciting development for the conservation of MAP species by implementing an International Standard for the Sustainable Wild Collection of Medicinal and Aromatic Plants (ISSC-MAP) which provide an international benchmark for sustainable use of this category of biological diversity. India being a front runner in use of medicinal and aromatic plants over centuries because of its strong traditions of Indian System of Medicines (ISM) for health care and also large number of ISM-, folklore- and tribal medicine-practitioners, lacks benchmark standards for sustainable use of biological diversity from the nature. Consequences are devastating for certain species.*

*India has large number of organisations engaged in various activities of MAP development, trade and utilization. But unfortunately no effective umbrella organisation is available to monitor, guide and regulate the various activities in a sustainable manner. Creation of medicinal plant board therefore, raises the hopes but failed to come close to modest expectation because of inadequate Human Resource availability within the board. Situation is also not bright as well in R & D organizations. They are also limping for want of human resource. There is lot of resources available for infrastructure development at present but no addition in manpower was allowed during IX and X Plan. Government policy for down sizing the establishment of institutions has created all irreparable damage to R& D organisations. We are gradually trailing behind in terms of scientific contributions in spite of our world class infrastructure created by our scientific planners. In fact, to keep the pace with the fast development of modern science, we should have exponential growth in R & D manpower. This pathetic situation, I discussed in this newsletter earlier and again raising with a hope that it would draw the kind attention of the finance ministry and the ban of recruitment would be lifted from R&D organisations at least in the XI plan.*

*I look forward with high hopes for the bright future of MAP sector.*

*Jai Hind !*

*Satyabrata Maiti*

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*...Continued from page 1*

*responsible for preventive/curative properties against various ailments. Also, phytochemicals could be identified for use as bio-pesticide. He reminded that our country was sustaining a major chunk of world population with only 2.3% of world's land. Hence, he suggested that agricultural scientists could not have liberty of not performing to their fullest ability. He hoped that NRCMAP would generate much needed technologies for medicinal and aromatic plants. The function came to end with the vote of thanks proposed by Dr. Manish Das, Sr. Scientist, NRCMAP.*

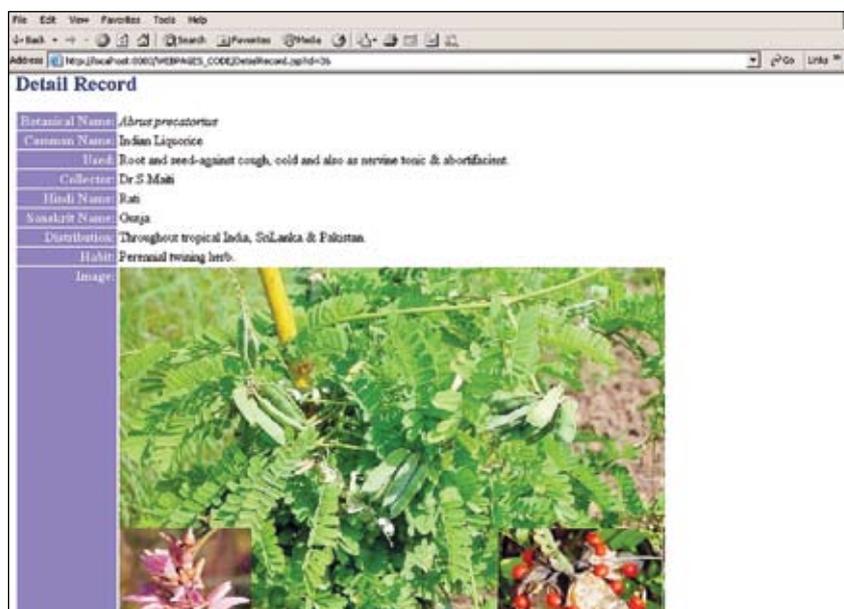
## Breakthrough & Research Highlights

### Digital Herbarium of Medicinal & Aromatic Plants launched online

A RIS cell at NRCMAP developed a web based interactive software application entitled "Digital Herbarium of Medicinal & Aromatic Plants in India". Dr. Satyabrata Maiti, Director, NRCMAP launched the online facility (linked in NRCMAP's site <http://www.nrc-map.org>) at the XV<sup>th</sup> Staff Research Council Meeting on 5<sup>th</sup> June.

Digital Herbarium is an authenticated collection of high resolution images of medicinal and aromatic plant specimens with their associated data which will help for their easier identification. The database presents alphabetical list of each plant along with its thumbnail view. Users can view the brief or detailed description about the accession and its enlarged view by clicking appropriate links. The site also provides information regarding the usage of the plant.

The software package is having two main options (modules) to



A view of digital herbarium

access the facility such as 'Client' and 'Administrator'. The client module allows the visitor to access the available information from the Digital Herbarium database. Anybody can visit the site with a formal registration procedure and will get the access to the site. User can also contribute to the refinement of the herbarium information to the master

database. The suggestions given by the user will be directed to the administrator for its consideration and inclusion to the main database. The administrator module manages the database by entering all the available species' information with digital photographs, delete unwanted information from the database and modify the existing database, etc.

### Variability in Brahmi from Kerala

Brahmi (*Bacopa monnieri*) is an important medicinal plant used as nerve tonic to promote mental health and to improve memory and intellect. It is an important constituent of 'Brahmighrita', a medicinal 'ghee' used in epilepsy, insanity and low dynamic disorders. The species naturally grows in damp condition spread over the coastal belt of Kerala and seen in the water sheds of foothills of Western Ghats. A wide spectrum of variability is noticed in the species with regard to various morphological traits. An extensive exploration was conducted by AINRPMAP, Trichur

and 29 accessions were collected from different geographical regions of Kerala. Significant associations were observed between number of leaves and biomass, leaf width and leaf area. Bacoside-A content was positively correlated with leaf width and leaf area. Detail study of association between different morphological characters and chemical constituents were also performed. On the basis of which it was suggested that the plants having more number of leaves with fleshy and wider leaf lamina and shorter internodes would contain higher Bacoside-A. Accession collected from Aluva (Ernakulam Dist.) was identified as high yielder with higher Bacoside-A content followed by

accession collected from Kottakkal (Malappuram Dist.).

### Comparative study of two *Swertia* spp.

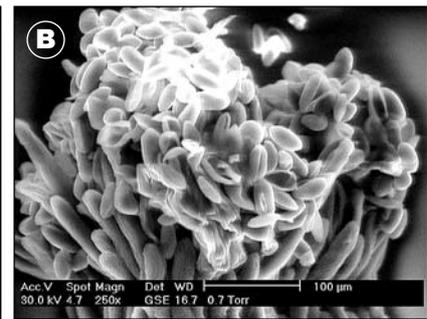
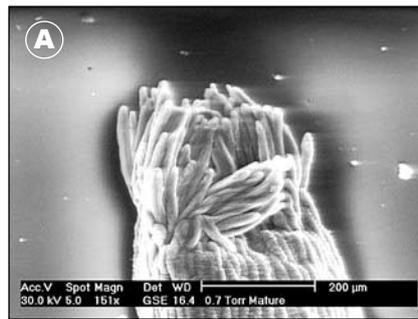
Two species of *Swertia* are commonly found at the higher altitudes of North Bengal. Among these *S. chirayita* is in demand for its medicinal properties however, *S. bimaculata* is used as an adulterant. Hence, a comparative study of plant characters of these two species of *Swertia* was conducted at AINRPMAP, Kalingpong. Plant height was almost same in both the species. Leaves were lanceolate in shape with 8-13 cm length and 2-3 cm breadth in *S. chirayita* whereas in *S. bimaculata*, leaf

shape was oval and yellowish green in colour, length was 7-11 cm and breadth 3-3.5 cm. Dark-purple pigmentation on the lower surface of the leaf was found in *S. chirayita* and pigmentation was not found in *S. bimaclulata*. Dark-purple pigmentation was present on the stem of *S. chirayita* and only nodal pigmentation was found in *S. bimaclulata*. Plant type of *S. chirayita* was erect without any branching whereas *S. bimaclulata* had more branching. Seed colour was brownish in *S. chirayita* and blackish in *S. bimaclulata*. Seed size was smaller and smooth in *S. chirayita* compared to *S. bimaclulata*. In both species, roots were light brown, somewhat twisted and gradually tapering with a length of 6-12 cm.

### Study of female reproductive part in *Aloe barbadensis*

Study conducted at NRCMAP showed that in *A. barbadensis* anthesis was staggered in nature and flowers opened throughout the day. Anthesis was maximum in the morning (41.39%) and evening (37.68%) hours. Minimum anthesis was observed during noon (17.97%). The process of anthesis in a flower initiated by longitudinal split in the distal end of perianth tube and completed within an hour.

Pistil consisted of an ovary with three locules with axile placentation. Ovules are arranged in two lines in each locule. Average number of ovules per ovary was 51.0. Style in



SEM photographs of (A) pre-receptive and (B) receptive stigmatic surface of *Aloe*

the mature bud was about 1.96 cm and ovary was about 4.79 mm × 2.75 mm in size. In a fully opened flower, style length was about 2.49 cm and ovary size was 4.98 mm × 2.84 mm. Style length continued to grow after anthesis and reached to a length of 2.91 cm. The style was a hollow tubular column, which was tri-radiate in cross section. Stigma was papillary and wet in nature.

Flowers produced nectar, which was secreted at the base of the ovary, inside the perianth tube. Nectar production was noticed in the flower at the time of anthesis and it continued for about three days. Flowers remained fresh for two days and in the second day, the pistils elongated and was easily visible, coming out of the flower. Withering of the flowers started on the third day of anthesis.

Pistils pollinated in the bud and anthesis stages showed no pollen tube growth on the stigma in decolorized aniline blue staining. It was found that receptivity started in the stigma after about six hours of anthesis. Peak receptivity of the stigma was found after 24 hours of anthesis, where a large number of pollen grains were

found germinated on the stigma surface with lot of pollen tubes growing within the stylar area.

Study of peroxidase activity in the stigma also indicated no stigma receptivity (pre-receptive period) in the freshly opened flowers. Pistils collected after four hours of anthesis and one day old flowers showed intense peroxidase activity indicating peak stigma receptivity and pistils of two day old onwards showed post stigma receptive period.

Scanning electron microscope (SEM) study showed that stigma surface was papillate and papillae were arranged closed together in a freshly opened flower and papillae were turgid and spread out in matured stigma and pollen grains were found attached among these papillae in the receptive stigma.

It can be inferred that late stigma receptivity initiation (after about 6 hrs of anthesis) and longer stigma receptivity duration (about 48 hours) coupled with the protandrous nature of the flower as well as pollinator visitation indicated adaptations for cross-pollination in this species.

## From the Institute

### Staff Research Council Meeting

XV<sup>th</sup> Staff Research Council Meeting (SRC) was held under the Chairmanship of Dr. Satyabrata Maiti, Director, NRCMAP during

5-6<sup>th</sup> June. All the Scientists presented their progress report pertaining to the ongoing research projects. Thorough discussion was held after each presentation. Some new project proposals were also presented. Several

modifications were suggested and finally incorporated in the proposals. Scientists also presented their targets for next six months. Altogether twelve projects covering different aspects of medicinal and aromatic plants such as crop

production, crop physiology, germplasm characterisation, plant breeding, quality management and information technology were presented.

### Research Advisory Committee (RAC) meeting

RAC meeting was held on 24<sup>th</sup> April at NRCMAP under the chairmanship of Prof. K.V. Peter, Kerala Agricultural University, Thrissur. Dr. O.P. Srivastava, Ex-Director, Institute of Agricultural Sciences, BHU, Varanasi and Dr. S. Maiti, Director, NRCMAP attended as members of the committee while Dr. (Mrs.) S. Samantaray, Sr. Scientist acted as Member Secretary. At the outset, Dr. S. Samantaray, welcomed the Chairman and members of RAC. Dr. S. Maiti, Director, NRCMAP presented work done report of the last one year. Chairman and other members appreciated the progress made by the Centre and congratulated the Director and Scientists of NRCMAP. After detailed deliberations, RAC suggested some important recommendations for further progress of the Centre.

### Institute Management Committee meeting

The Institute Management committee meeting was held on 25<sup>th</sup> April, 2007 under the chairmanship of Dr. Satyabrata Maiti, Director, NRCMAP. The meeting was attended by Dr. B. G. Bagle, Head, CHES, Godhra, Dr. A. R. Pathak, D. R. & Dean, Faculty of Agriculture, Anand Agriculture University, Dr. S. Samantaray, Sr. Scientist (Biotechnology), Dr. M. Das, Sr. Scientist (Plant Physiology),

Dr. K. Mandal, Sr. Scientist (Plant Pathology), Mr. V. S. Parmar, AAO and Mr. T. A. Vishawanath, AFAO as members. Dr. Maiti presented the recommendations of the QRT, AINRP on betelvine for information to the committee. The committee reviewed the various research and developmental activities of the institute and suggested a number of measures to speed up the development of the institute.

### Our New Colleagues

- Dr. P. Manivel, Pr. Scientist (Plant Breeding) joined on 24.3.07
- Dr. Vipin Chowdhary, Sr. scientist (Entomology) joined on 9.4.07
- Dr. G. R. Smitha, Scientist (Horticulture) joined on 17.5.07

### Transfer

- Dr. Deepa Bhagat, Scientist SS (Organic Chemistry) transferred to Project Directorate of Biological Control, Bangalore on 27.3.07

### Promotion

- Dr. K. Mandal joined as Sr. Scientist (Plant Pathology) through selection w.e.f. 6.3.07
- Dr. Geetha K. A. joined as Sr. Scientist (Plant Breeding) through selection w.e.f. 28.3.07

### Distinguished visitors

- Dr. G. Kallou, Ex-DDG (Hort.), ICAR on 18.1.2007

- Dr. S. P. Ghosh, Ex-DDG (Hort.), ICAR, New Delhi and Chairman, QRT, Betelvine on 23-25 February, 2007
- Dr. P. P. Reddy, Ex- Director, IIHR, Bangalore and Member, QRT, Betelvine on 23-25 February, 2007
- Dr. Mangala Rai, Secretary, DARE & DG, ICAR on 14.3.2007
- Dr. J. S. Samra, DDG (NRM), ICAR, on 14.3.2007
- Prof. M. C. Varshneya, Vice Chancellor, AAU, Anand on 14.3.2007
- Dr. S. Nagarajan, Chairperson, PPV&FRA, Govt. of India, New Delhi on 19.3.2007
- Dr. B. S. Yadav, Chairman, QRT, AICRP on Nematode on 24.3.2007
- Prof. K. V. Peter, Chairman, RAC on 24.4.2007
- Dr. Mohan Lal Sharma, PCCE, Govt. of Gujarat on 25.4.2007
- Sh. R. V. Asari, Addl. PCCE, Govt. of Gujarat on 25.4.2007
- Dr. G. L. Kaul, Ex.Vice Chancellor, AAU, Jorhat on 7.5.2007
- Dr. B. R. Tyagi, Chairman, QRT, NRCMAP & AINRP MAP on 23-25 May, 2007
- Dr. R. Krishnan, Member, QRT, NRCMAP & AINRP MAP on 23-25 May, 2007
- Dr. P. Das, DDG (Ag. Extn.), ICAR, New Delhi on 16.6.2007

## Human Resource Development

Name	Course	Date
Dr. Geetha K. A., Sr. Scientist (Pl. Br.)	GIS based decision support systems for sustainable agriculture at NAARM, Hyderabad	March 1-21, 2007

## Initiative for revival of Guggal

**G**uggal (*Commiphora wightii*) is a shrub naturally distributed in the drier western parts of the country. It yields a oleo-gum-resin which is widely used in ayurvedic preparations and reported to reduce cholesterol level besides providing relief against rheumatic arthritis. Traditionally, a plant of 10-12 years age is used for extraction. The oleo-gum-resin is extracted through tapping. However, the plant dies after successful tapping. This is one of the main reasons why the cultivation is not catching up. Natural population is dwindling and the plant has entered into the endangered category. Country's annual requirement of 1000 tonnes of resin is mainly met by import from Pakistan. Union health minister Dr. A. Ramadoss recently sanctioned a massive guggal revival project. As a follow through, National Medicinal Plants Board has initiated a networking project for this species. NRCMAP has been given the responsibility to identify different partners and make a consortium to start working on project guggal. NRCMAP and its AINRP partner, AAU has about 20 years' of research experience with guggal. NRCMAP has a rich repository of guggal germplasm (70 accessions) and continuously working on development of good agricultural practices and standardisation of tapping technique. In time to come, we hope, this humble plant will come out of the oblivion to regain its old glory.

## *Piper longum* L.



**P***iper longum* or long pepper belongs to family Piperaceae is known variously in different Indian Languages viz., Pipli, Hippali, Thippali, Pimpli, Pippali, etc. It is an evergreen scandent herb distributed in moist deciduous to evergreen forests at an altitude of 500-1500 m. It is globally found in Indo-Malaysia region. In India the species is distributed in the moist tropical areas of Eastern Himalayas and other hilly regions of Western Ghats in Kerala and Tamil Nadu. It is presumed to be native of East India.

Branches are erect or, sometimes climbing with swollen nodes and with creeping branches with roots at lower nodes. Leaves are alternate, variable in shape with acute to acuminate apex. Lower leaves are pedicellate and upper leaves are sessile.

Flowering occurs in September to November and also from March to June. Male inflorescence is longer

than female inflorescence. Female inflorescences are economically important and become red at maturity. Fruits (mature unripe) and roots are used to treat diarrhoea, indigestion, jaundice, urticaria, abdominal disorders, cough, flatulence, chest congestion, and throat infections. It is one of the ingredient of the famous herbal formulation 'trikatu'. Roots are known under trade 'pipplamool'. Lower portions of stems are used to adulterate the pipplamool.

The study conducted by FRLHT (Foundation for Revitalization of Local Health Traditions), Bangalore on 110 prioritised species from Southern States i.e., Kerala, Karnataka and Tamil Nadu included the species under 100 threatened categories of medicinal plants. The species is enlisted as 'endangered' in Tamil Nadu and at 'lower risk to near threatened' in Kerala. However, the species is under cultivation in selected areas of Maharashtra, Assam and Kerala.

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