



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 Project on Medicinal & Aromatic Plants (AINPMAP).

AINPMAP 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 AINPMAP.

Contents

RAC meeting of NRCMAP.....	1
Editorial	2
Breakthrough & Research Highlights.....	3
Patchouli farmers' meeting & training.....	4
Review meeting of DBT sponsored patchouli project	4
SRC meeting.....	4
IMC meeting.....	4
From the Institute	5
Human Resource Development.....	5
Threatened Plant	6

RAC meeting of NRCMAP held



Research Advisory Committee meeting of NRCMAP was held on 5th April, 2006. The meeting was presided over by Prof. K. V. Peter, Vice Chancellor, Kerala Agricultural University, Thrissur. The meeting started with the welcome address by Dr. (Mrs.) S. Samantaray, Sr. Scientist (Biotechnology), NRCMAP and Member Secretary of RAC. Dr. Peter appreciated the work done in the institute during last one-year period. Dr. Sushil Kumar, Ex-Director, CIMAP, Lucknow advised that the Centre should focus on development of package of practices and elite planting material of selected MAPs. Dr.

O. P. Srivastava, Ex-Director, Institute of Agricultural Sciences, BHU, Varanasi highlighted the need for balanced nutrition of MAPs.

Dr. Satyabrata Maiti, Director, NRCMAP made an elegant presentation on the research work done since February 2005. The Chairman and members appreciated the presentation and deliberated upon the presentation which led to some useful recommendations for further progress of the Centre. The meeting came to an end with the vote of thanks proposed by Mr. K. Mandal, Scientist, NRCMAP.

EDITORIAL

Harnessing herbal heritage of India

India is known for its various traditional systems of medicine (TM) that have been developed and practised from the time immemorial. A large number of traditional healing systems such as Ayurveda, Siddha, tribals medicine, folk medicine, etc are widely practised in India for treatments of very complex and acute to chronic complicated diseases like cancers to simple requirement of primary health care. As per the WHO estimate about 80 percent of the world population are depending greatly upon these Traditional health care systems for their primary health care needs. Modern medicines are yet to be accessible to mass for various obvious reasons. But surprisingly, there are lot of resistance to accept the theory and practice of TM by the Western-style doctors not only in India but the similar situation existed in China who has become a role model for modernizing their TM by the marriage of Western and Chinese medicines which still shows signs of strain and twist, though divorce certainly seems unlikely in the near future.

This union between Western and Chinese medicines could be possible because of the political will that was shown by China through a dramatic shift in emphasis to exalt traditional medicine by creating research institutes to explore valuable cultural legacy in 1954.

In India such political will was missing to promote our 5000 years old Ayurveda or other traditional systems of medicine. Although we created a separate ministry to promote Indian Systems of Medicine but with lack of aggressiveness, it did not produce the expected result. One major cause of continued strain and contradiction between Western medicine and TM is the theoretical incompatibility of Western and purely traditional medical systems. Modern medicines have evolved in the closest possible consonance with a scientific method that originated in physics. On the contrary Indian Systems of Medicine is a rational construction originated from basic conceptions of the universe and its microcosm, human. Data taken from experience were systematically worked and synthesised into a metaphysical structure that could be neither reinforced nor destroyed by experimental proof.

Because of a fundamentally different approach, it is extremely difficult for Western-trained scientists or practitioners to evaluate the products of medical traditions that lacked the idea of experimental control and a metaphysical system that defied empiric rejection.

Indian Systems of Medicine go all-out to treat the whole

person rather than his isolated parts or ailments, and to think of him in relation to his emotional sphere and physical body.

To day the drugs of ISM are not accepted in USA and Europe. The current regulatory system in the United States does not adequately assure continued access to and safety of traditional medicines. These products do not fit neatly into either the current "food" or "drug" categories defined by the Federal Food, Drug and Cosmetic Act. However, some traditional medicines are marketed under the Dietary Supplement Health and Education Act, which provides a regulatory framework for dietary supplements, but certainly, these are not be sold as medicines.

It is now heartening to note that representatives of each of the sponsors of the Traditional Medicines Congress have created a specific proposal for a better way to regulate traditional medicines. A clearly specified goal was agreed upon to emphasize both the value of traditional medicines and the responsibilities that are associated with their use. The goal is set to benefit public health by ensuring access to traditional medicines in a manner that provides a reasonable expectation of public safety. TM congress recognized ingredients in traditional medicines are limited to those that are identified in authoritative references, established monographs or recognized compendia. It has included all editions and volumes of the Ayurvedic Pharmacopoeia as well as all editions and volumes of the Ayurvedic Formulary of India.

I am sure that the Proposed Regulatory Model for Traditional Medicines once implemented, our industry will be benefited immensely and shall get the protection under the well regulated Act. The quality and safety of TM, which is often a question, will be assured to the end users. Medicinal Plants Sector will also get advantage since supply of quality raw drug will be a matter of serious concern for assuring the quality and safety of the end products. India must gear up now to harness the opportunity that is going to be created in the US market by implementing Regulatory Model for Traditional Medicines in USA.

I look forward to a very bright future of The Medicinal Plant Sector.

Jai Hind !!

Satyabrata Maiti

Breakthrough & Research Highlights

Single leaf propagation of patchouli

Patchouli is conventionally propagated through the rooted stem cuttings. However, it requires large amount of biomass. Earlier, attempts were made for raising plants from single leaf to increase the multiplication ratio from single source of planting material. However, it was reported that the complete plantlet development from the leaves took nearly 160-180 days. At NRCMAP, it was found that the leaves produce fully developed plantlets in 60 days at green house conditions. Hence the suitability of leaf pairs for the propagation of patchouli and the time taken for complete plantlet



Plantlets developed from 3rd & 4th leaf pairs

development was examined. Leaf pairs of different nodes from the stem apex were used to find out the suitable leaf for the propagation of patchouli using this technique. Second to fifth leaf pairs from the top were used for the study.

Rooting was earliest in the fourth leaf pairs (7.33 days), followed by third pair (9.0 days). Shoot initiation was also found earliest in fourth leaf pair (14 days) and it was followed by fifth leaf pair (16 days). Fourth leaf pairs took lowest time (14 days) for shoot initiation. Plantlets developed from fourth leaf pairs were found to have highest percent of survival at 30 days (93.33%) and at 45 days (72%). The lowest percent of survival was found in plants developed from fifth leaf pairs (23.67 % at 30 days and 12.67 % at 45 days). At the time of transplanting, plant height of the newly developed plantlet was highest (15.20 cm) when fourth leaf pair was used for propagation.

Different shade levels influence yield and quality of kalmegh

The medicinal herb, Kalmegh (*Andrographis paniculata*) is widely used in indigenous system of medicine for treatment of various ailments. It grows as understory plant in the wild. A two-year field study was conducted on sandy loam soil at NRCMAP to see the influence of shade on plant growth, yield and quality of the product. The plants were grown under 25, 50, 70 and 100% of incident photosynthetic photon flux density (PPFD) using different ago-shade nets. Leaf photosynthesis increased from $11.56 \mu\text{molm}^{-2}\text{s}^{-1}$ to $19.70 \mu\text{molm}^{-2}\text{s}^{-1}$ as PPFD increased from 25 to 100%. Herbage yield per plant increased from 226.70g to 379.45g. Andrographolide content was not consistent under different PPFD levels. Leaf andrographolide content was maximum under 100% PPFD in the first year and 50% PPFD in the subsequent year. However, total andrographolide yield from whole plant was highest under open light level (100% PPFD).

Gender instability in guduchi

Guduchi (*Tinospora cordifolia*) is an important medicinal plant recognised as a wonderful immuno-modulator in modern medicine. The species flowers profusely during November to May. Appearance of female phase in staminate flowers was observed for the first time in the population in the germplasm collection at NRCMAP. This temporary expression of bisexuality or hermaphroditism in males was not reported in the species earlier. In some of the male plants development of pistils started from February resulting, hermaphrodite flowers. Interestingly, at this time, within the male plants both staminate and hermaphrodite flowers were observed, however, in different frequencies. All the male plants were converted to hermaphrodites by April and gradually they again reverted to males starting from May. In the beginning of the conversion process, small protuberances appeared in the centre of staminate flowers producing no fruit set.

However, at later stage, fully developed pistils were formed and fruits were developed. Although there were three pistils same as in the case of pistillate flowers, fruit setting was not successful in all these hermaphrodites, especially in the initial month of the sex conversion and later about 12% of the hermaphrodite flowers set seeds. It was observed that only one to two or rarely three fruits were developed normally in these sex-converted flowers. However, in case of females, the gender expression was highly stable and fruit setting success was recorded about 100%.



An inflorescence showing male flowers and developing fruits

Variability in starch content of guduchi stem

Mature stem of guduchi (*Tinospora cordifolia*) is reported to be acrid, bitter, hot, restorative, aphrodisiac and alleviative of all the three *doshas* or morbidities and also used as digestive tonic. It cures fever, jaundice, thirst, burning sensation, diabetes, piles, skin ailments,

respiratory disorders, neurological diseases and improves intellect. Starch (Guduchi satva) from the aqueous extract of the dry stems is used as tonic against several diseases causing debility. At NRCMAP, phyto-chemical screening of more than 40 accessions of guduchi germplasm, collected from different parts of Gujarat and maintained in the field gene bank, revealed that there is a lot of variability in the

case of starch content among the different accessions. Starch content varied from 1.22% (accession K 88) to 13.32 % (accession IC 283959) on dry weight basis of the stem among the male accessions. Among the females, it varied from 0.99 (NMRM 13) to 8.88 % (accession IC 310621). A superior genotype having high starch content (>12%) has been identified for commercial cultivation.

Patchouli farmers' meeting & training

Training workshop was conducted at NRCMAP on 7th April 2006 for interested farmers on patchouli cultivation. During the training, farmers interacted with Dr. A.P. Singh (Member Sec. SMPB), Mr. B.S. Sajwan (CEO, NMPB) and Dr. S. Maiti (Director, NRCMAP) and got clarified their doubts regarding the funding and government support for the patchouli cultivation. A field visit was also organised for patchouli farmer's field for imparting hands on training for growing patchouli under Gujarat conditions.

Review meeting of DBT sponsored patchouli project

The monitoring committee meeting of DBT-sponsored project on "Biotechnological approaches for production and cultivation of patchouli" was held on 13th April 2006 at NRCMAP. Dr. Satyabrata Maiti, Director, NRCMAP presided over the meeting. Dr. Mohd. Aslam, Principal Scientific Officer, DBT, New Delhi, Dr M.R. Heble, Principal Scientific Advisor, KET, Dr. Anupama Wagle, Principal investigator, KET along with members of different participating centre including Dr. B.B. Jadav (KKV), Mr. C.K. Venugopal (UAS, Dharwad), Dr. Ravi Bhat (CPCRI, Kasargode) and Mr. Saravanan Raju

(NRCMAP) attended the meeting. The research works undertaken at various centres and the progress report was presented in the meeting. The research results were critically discussed along with future plan of action for different centres in the meeting. A field trip was also arranged for the participants to a patchouli farm at Adas village.

Research review and staff research council meetings

As a follow up action of SRC, a Research Review Meeting (RRM) was held on 30th January, 2006 under the chairmanship of Dr. S. Maiti, Director, NRCMAP. Individual scientists particularly Principal Investigators (PI) presented their progress reports, results and work done of their respective projects in RRM.

Staff Research Council (SRC) meeting of the Institute was held during 29th June to 3rd July, 2006 under the chairmanship of Dr. S. Maiti, Director, NRCMAP. In SRC, work done during the previous six months were presented by all the scientists. A few new project proposals were presented and discussed thoroughly. Several modifications were suggested and finally incorporated in the proposals. Scientists also presented their targets for next six months. New projects were finally modified and approved in RRM and SRC are as following:

- Collection, characterization and maintenance of *Tinospora cordifolia* germplasm.
- Standardization of methods of micropropagation in Isabgol.
- Physiological and biochemical studies in relation to mucilage synthesis in *Plantago ovata* Forsk. and development of Good Agricultural Practices in *Plantago psyllium* L.
- Simultaneous quantitative analysis of saponins, alkaloids, terpenoids, steroids and polyssacharides from *Asparagus racemosus* by using HPLC coupled with MS/MS
- Studies on seed physiology and minimum seed standards in selected medicinal and aromatic plants.
- Physiological and biochemical studies in Aloe (*Aloe barbadensis* L.) and Senna (*Cassia angustifolia*) secondary metabolism.

Institute Management Committee meeting

The Institute Management Committee meeting was held on 18th March, 2006 under the chairmanship of Dr. Satyabrata Maiti, Director, NRCMAP which was attended by Dr. K. V. Ramana, ADG (PC), ICAR, Dr. R. S. Kurothe, Head, CSWCR&TI

Vasad, Dr. (Mrs.) Sanghamitra Samantaray, Sr. Scientist (Biotech.), Mr. N. S. Rao, Scientist (Comp. Appli.), Mr. T. A. Vishwanath, AFAO and Shri V. S. Parmar, Assistant Administrative Officer as members. 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.

From the Institute

Our New Colleauge

Mr. Naresh Ganatra, Sr. Clerk joined on 17.4.2006

Transfer

Dr. P. P. Joshi, Principal Scientist transferred to CIFE, Mumbai on 29.5.2006

Mr. Shyamji Shukla, Sr. Clerk transferred to NBAIM, Mau Nath Bhanjan, on 24.4.2006

Sports

Mr. R. B. Bhoi bagged 2nd prize in high jump in the ICAR Zonal Sports Tournament held at CAZRI, Jodhpur during February 7-11, 2006.

Distinguished visitors

□ Prof. I. L. Kothari, Professor, Department of Bio-sciences,

SPU, V. V. Nagar on 17.3.2006

□ Dr. K. V. Ramana, ADG(PC), ICAR on 18.3.2006 and 5.4.2006

□ Dr. D. J. Patel, Ex.Principal, BACA, AAU, Anand on 18.3.2006 and 7.4.2006

□ Prof. L. K. Vaswani, Director, IRMA, Anand on 21.3.2006 and 22.6.2006

□ Dr. K. V. Peter, VC, KAU and Chairma, RAC on 5.4.2006

□ Dr. Sushil Kumar, Ex-Director, CIMAP, Lucknow & Member, RAC on 5.4.2006

□ Prof. O. P. Srivastava, Director, IAS, BHU & Member, RAC on 5.4.2006

□ Mr. A. V. Guram, Asst. General Manager, NABARD, Nadiad on 7.4.2006

□ Mr. B. S. Sajwan, IFS, CEO, NMPB, New Delhi on 7.4.2006

□ Dr. A. P. Singh, Member Secretary, SMPB, Gandhinagar on 7.4.2006

□ Dr. Mohd. Aslam, Principal Scientific Officer, Department of Biotechnology, Govt. of India, New Delhi on 13.4.2006

□ Dr. M. R. Heble, Scientific Advisor, KET, Mumbai on 13.4.2006

□ Dr. Anupama Wagle, PI, The Kelkar Education Trusts, Mumbai on 13.4.2006

□ Dr. R. K. Pathak, Advisor, National Horticultural Mission, GOI, New Delhi on 10.6.2006

□ Prof. P. Das, Project Director, MSSRF, Jeypore on 17.6.2006

Human Resource Development

Name	Course	Date
Dr. Manish Das, Scientist (Sr. Scale) Plant Physiology	Leadership and personality Development at NAARM, Hyderabad	14-20 June, 2006
Dr. (Mrs.) Sanghamitra Samantaray, Sr. Scientist	Leadership and personality Development at NAARM, Hyderabad	14-20 June, 2006
Dr. O. P. Aishwath, Scientist (Sr. Scale) Soil Science	Summer School on Advances in Agricultural Research Project Management at NAARM, Hyderabad	1-21 June, 2006
Mr. N. S. Rao, Scientist Computer Application & Public Information Officer	National Workshop on "The Right to Information Act, 2005 (RTI)" at Mumbai	23-24 June, 2006
Mr. Raghunadhan K., Asstt. Public Information Officer	National Workshop on "The Right to Information Act, 2005 (RTI)" at Mumbai	23-24 June, 2006
Mr. Suresh Patelia, PA to the Director	Training on Information Bank Software at NBPGR, New Delhi	12 June, 2006

Micropropagation of *Soymida febrifuga*

NRCMAP is working on development of micro-propagation protocol of *Soymida febrifuga* as its natural propagation through seed and vegetative means are also low. Apical and lateral bud breaking from nodal explant could be observed in MS medium supplemented with BA, IAA, adenine sulphate and sucrose after 11 days of inoculation. Elongation of sprouted buds and shoot multiplication were also achieved in the same medium. Petiole explants were used for callus development study. Callus initiation and globular callus formation could be achieved in a MS medium supplemented with kinetin, 2,4-D and charcoal. The study is the first report of the micro-propagation success in this species and it may open the new avenues for mass multiplication of this threatened species.



Sprouting of apical bud in tissue culture

Soymida febrifuga (Roxb.) A. Juss



Soymida febrifuga belongs to family, Meliaceae. It is commonly known as Rohini, Rohan or, Patranga. It is a lofty deciduous tree of 22-25 m length and 2.5-3 m girth with a clean bole of 3-4 m. and distributed in the dry forests of peninsular India right upto Kerala and also occurs in Gujarat, Uttar Pradesh, Bihar and central India. The tree sheds leaf during winter. In central India flowering occurs between February and March and fruiting takes place from April to June.

Leaves of the tree are 22-45 cm long and crowded at the ends of branches. Flowers are greenish white in large terminal panicle. Fruits are capsules, black and woody with winged seeds. The tree has an aromatic

odour when cut. Bark is very tough and used as rope also. Bark contains resinous bitter principle and a popular drug in indigenous medicine. It is known to have astringent and antiperiodic properties. The bark is used in the treatment of diarrhoea, dysentery and fevers and also as bitter tonic to treat general debility. Formerly, bark was used as an antimalarial and substituted with cinchona bark. It is also some times prescribed for the treatment of rheumatic swellings.

Propagation is by seeds that are dispersed in nature by wind. Germination is best in porous, well drained soil. Initial growth of the seedling is slow. Plant has become threatened in Gujarat and needs care for its revival.

Editor : Dr. Satyabrata Maiti, Director

Associate Editor : Mr. Kunal Mandal, Scientist (Senior Scale) (Plant Pathology)

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