



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.

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Laboratory-cum-Office Building of NRCMAP Inaugurated



Inauguration of Laboratory-cum-Office building (Phase-II) of NRCMAP was held on April 12, 2005. Dr. Mangala Rai, Secretary, DARE & Director General, ICAR was the chief guest of the function. He inaugurated the building by cutting ribbon and unveiling the commemorative stone. Dr. G. Kalloo, DDG (Hort.), ICAR and Prof. M. C. Varshneya, VC, AAU, Anand were among the other distinguished guests present in the function.

At the beginning, Dr. Satyabrata Maiti, Director, NRCMAP welcomed all the dignitaries with bouquet. He informed that the institute was working efficiently even with shortage of manpower. He expressed that inauguration of the building would add more facility and comfort to the institute in serving the nation more efficiently. On behalf of the

NRCMAP family, he presented mementos to the honourable guests. Superintending engineer, CPWD, Gandhinagar, Mr. S. L. Jain presented a detail overview of the construction of the building in his project report.

Dr. G. Kalloo expressed his satisfaction about functioning of the institute and wished that NRCMAP would become an important player in the field of medicinal plant research in the days to come. He urged that the plants effective against the diseases of modern times – blood pressure, blood sugar, arthritis, angina, etc. should also be given priority.

Dr. M. C. Varshneya expressed his pleasure to be a neighbour of this institute. He hoped that the work done in this centre would bring

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EDITORIAL

Harnessing herbal heritage of India

India has a rich heritage and long history of using medicinal and aromatic plants in improving the quality of life. India is also fortunate to have the richest reservoir of traditional herbal medicinal plants and prescriptions. The Indian system of medicines comprises of Ayurveda, Siddha and Unani are having their firm root in our society and influence in life style. Ayurveda is about 5000 years old and predominantly use medicinal plants for their preparation and formulations. Modern pharmacopoeia also listed at least 25% of drugs derived from plants and vast majority although synthetic analogues built on prototype compounds isolated from plants.

India's plant bio-diversity is one of the richest in the world. It is the home of about 8000 of all plant species on the earth many of which have not been fully explored and cultivated. Western Ghat and Himalayas are the most tempting locations for those in the bio-industries causing a serious danger to the wealth due to its over exploitation causing serious depletion. From the time immemorial, India has long heritage of use of herbal products as medicine, cosmetics, health hygiene, toiletries, fragrance and food supplements.

As per the estimates of the WHO about 80% of the worlds population depends of herbal medicine for their primary health care. Cure of some of the deadly and painful diseases such as cancer, HIV, AIDS, rheumatic arthritis, etc. look promising from herbal source. While the demand for herbal medicines is growing in developed countries, there are indications that consumers in developing countries are becoming disillusioned with modern healthcare system and seeking alternative to traditional medicines. Sale of herbal medicines is fast increasing in developed countries in recent past. In 1994, the prescription for St. John's Wort was worth DM 61 million compared to DM 30 million of Prozac (Law, 1999).

Increasing demand for herbal medicines has resulted in "slaughter harvesting" of medicinal plants from the wild habitat. At present 90% of medicinal plants come from the wild. This trend does not promise sustainable use of medicinal plants which fulfils health care needs of majority of populations. Not only that the collection and processing of medicinal plants and plant products contributes at least 35,000,000 man days each year to Indian economy as both full and part time employment. About 80% of India's net forest export earnings come from non-wood forest products and medicinal plants are one of the most important component of non-wood forest products. However, the medicinal plants trade in India

is extremely complex, secretive, traditional, poorly organized, highly wrongly estimated and unregulated.

Therefore, challenge ahead of us is to become a **significant player** in the global herbal market by recognizing and addressing the need of each of the different stakeholders which requires a holistic approach for overall development of the total medicinal sector. This would be only possible if a team is created at national level under the direct supervision of the Honourable Prime Minister. A sub-team of five to ten **hand picked** scientists in each institution is to be created exclusively to work on MAP project. Career advancement of these scientists must be performance based and that may be made clear to them in the beginning. Performance of the project must be judged on the basis of number of products developed up to commercial level.

I look forward to see such a project soon, if at all we have to harness our herbal heritage for our prosperity by commercialisation.

Jai Hind!!

Satyabrata Maiti

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back the glory of Ayurvedic system and the farmers would be benefited from the technology generated.

Dr. Mangala Rai, Chief guest of the function advised that to be a vibrant institute, we must be ready to establish a coherent and complementary coordinated cooperation among all the players of medicinal plant sector. He suggested that this type of cooperation would increase synergistic holistic growth and would increase the velocity of the work. He urged that the time had come to utilise the available resources in right direction so that we could generate the right types of process, products, knowledge and technologies. He reminded that identification of one or two molecules against any dreaded disease would generate enough resources for the country.

Dr. Rai also laid foundation stone of the residential complex at the Lambhvel farm of NRCMAP. To commemorate the occasion, the dignitaries planted saplings of different medicinal plants in the Medicinal Plant Botanical Garden.

Breakthrough & Research Highlights

Synthetic seed production in Aloe

The flowering plants have been bestowed by nature with a unique ability to produce seeds which ensure the perpetuation of their type and spread the species to new areas. Today, it has become possible to produce artificial vegetative seeds by modern biotechnological tools.

Aloe barbadensis is an important medicinal plant. It is the source of aloin and aloe gel besides many other compounds. It is used in



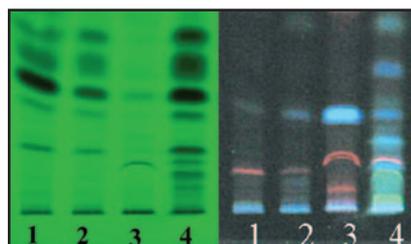
Synthetic seeds of Aloe

preparation of a large number of products and demand for aloe products has increased

tremendously during last few years. Therefore, call for an urgent need for mass propagation of the species was felt since its natural propagation is rather slow for commercial purposes. Production of synthetic seeds is a cost-effective technique for micropropagation and therefore, an efficient protocol for production of synthetic seeds in *Aloe* has been developed in the institute. *In vitro* grown small shoot buds were encapsulated in sodium alginate and soaked in CaCl_2 solution to produce viable synthetic seeds.

Chemical fingerprinting of Guggal

Guggal [*Commiphora wightii* (Arn.) Bhandari] is a small tree found in the dry western parts of the country. The oleo-gum-resin exudate of this plant is known as guggal gum in the trade. It has wide medicinal applications against rheumatoid arthritis, obesity, etc. Two major sterols *viz.* guggulosterone-Z and guggulosterone-E are known to have hypolipidemic activity. A chemical fingerprinting method for major sterols in guggal was standardised by NRCMAP. This method was used to compare different parts of the guggal plant. The result of chemical fingerprinting of various parts showed presence of highest number of chemicals (bands) in bark.



Chemical fingerprint of guggal plant parts
(1 Fruit, 2 Wood, 3 Leaf, 4 Bark)

Reproductive biology of sankhpushpi

Sankhpushpi (*Convolvulus microphyllus*) is a *medhya* drug, which contributes considerably to the improvement of the memory power and intellect. The whole plant possesses medicinal properties. Study of reproductive biology in the medicinal plants has often overlooked. However, it gives vital information for crop improvement through breeding. Reproductive biology of sankhpushpi was studied at NRCMAP.

Anthesis in cooler months (December, January and February) initiated comparatively late (between 8.30-8.45 am) and completed within 1 to 1.30 hrs. However in March and April, anthesis initiation was during 7.00 am and 6.30 am, respectively and completed within 30 minutes. Diameter of the flower ranged from 10.75-17.50 mm, length of peduncle and pedicel ranged from 1.09-15.59 mm and 0.35-3.56 mm respectively, sepals and corolla lengths showed variation ranging from 3.18-9.52 mm and 7.73-13.37

mm, respectively. Pollen dispersal took about 1.00 to 1.30 hours after initiation of anthesis in cooler months and only 15-30 minutes in March and April. The size of pollen grains ranged from 29.04 to 33.2 μm . Acetocarmine test showed about 83.60% of the pollen stained and FCR test revealed 81.47% viable pollen grains. Brew Baker medium with 30% sucrose showed maximum pollen germination (56.25%) at room temperature (28°C). Pollens remained viable for 16.30 hrs when stored at room temperature, while in refrigerated condition it germinated even after 28 hours of storage. Stigma was found to be receptive up to 4 pm. The species was an insect pollinated type and the insects were identified as *Apis* spp. Self pollination was highly limited in the species with pollination success of 0 to 15% while cross pollination success was about 70 to 85.29%. In open pollinated pistils, pollination success was 53.33%. Stigmatic pollen and ovule ratio was highest in cross-pollinations (3.69-7.27) and lower in self pollinations (0.0-0.65). In open pollination, it was 2.11.

IPGRI Scientist visited NRCMAP

Dr. Sok Young Lee, Associate Scientist, IPGRI Regional Office – Asia Pacific Oceania, Malaysia visited NRCMAP on May 5-6, 2005. Dr. Lee, a plant physiologist by training was working at Malaysia to develop e-descriptors based on Multicentrix System Model. His visit to NRCMAP was to train scientists for developing e-descriptors of medicinal plants. He interacted with the researchers and explained the working of the Multicentrix model. NRCMAP has taken up the work of developing e-descriptor for medicinal plant using the medicinal plant database.

RAC meeting held

Third Research Advisory Committee (RAC) Meeting of the institute was held on February 2, 2005 under the Chairmanship of Prof. K. V. Peter, Vice Chancellor, Kerala Agricultural University, Thrissur. Dr. G. N. Qazi, Director, Regional Research Laboratory, Jammu; Dr. O. P. Srivastava, Director, Institute of Agricultural Sciences, BHU, Varanasi; Dr. K. V. Ramana, ADG (PC) and Dr. S. Maiti, Director, NRCMAP were members of the committee.

The Chairman and members were honoured by presentation of bouquets by Dr. S. Maiti and were welcomed by Dr. S. Samantary, Member Secretary, RAC.

Prof. K. V. Peter expressed that phytochemistry must play an important role in medicinal and aromatic plants research. He suggested that coordination and networking with other medicinal plant boards, national institutes, private agencies, etc. were essential. He was happy to proclaim that the centre could be an institute within next 4 to 5 years and then could claim to be a deemed university.

Dr. G. N. Qazi, expected this centre to provide the most appropriate and accurate raw material. He invited research collaboration between the NRCMAP and RRL. He also suggested that NRCMAP might also work at least on two to three crops covering studies on all aspects by which it would develop authority on these crops and also could become certifying agency in future.

Dr. Srivastava opined that collection and screening of old literature related to medicinal and aromatic plants would be of much significance. He suggested taking up studies on production of secondary metabolites due to stress, study on micronutrients deficiency, toxicity and working on analysis of soil and crop in relation to requirement of particular nutrient.

Dr. K. V. Ramana desired to add clinical aspects in the mandate of NRC in near future. He also emphasised on prioritisation and focused work.

Research achievements of the Centre were presented by Dr. S. Maiti. He also reminded the house about the limitations and strength of the NRC. The Chairman and members of the RAC reviewed the work presented and gave several suggestions for future work.

Dr. Manish Das, Scientist (Plant Physiology) presented revised Perspective Plan (Vision 2020) before the committee. The distinguished members of RAC suggested some important points for inclusion.

World Bank Sponsored Brain Storming Discussion held at NRCMAP

After the end of National Agriculture Technology Project (NATP), ICAR is trying to develop a new project in centre of excellence mode. In this context, a team comprising of experts from the World Bank (WB) Dr. William Janssen, Dr. P. Sidhu, Dr. Rabih Karaky; stall warts in the different fields of medicinal plants – Agricultural, Ayurveda and general Universities, NGO, Industry, Medicinal Plant Board, Management Institute, etc. took part in a one day brainstorming discussion. Dr. S. Maiti welcomed the delegates in the meeting. Dr. Mruthyunjaya, National Director, NATP chaired the meeting and explained that in the new mode medicinal plants would be given the priority and the project would be developed considering all aspects from production to consumption. He also explained that the purpose of the meeting was to develop the project design with the goal of identifying the partners. Dr. S. Maiti presented the scenario of medicinal plant trade in India and identified the possibilities to start the work. The experts discussed the problems and opportunities in this sector and on the basis of the discussion a prototype project was formulated.



From the Institute

IMC meeting

The Institute Management Committee meeting was held on February 3, 2005 under the chairmanship of Dr. Satyabrata Maiti, Director, NRCMAP. It was attended by Dr. K. V. Ramana, ADG (PC), ICAR; Dr. R. S. Kurothe, Head, CSWCR&TI, Vasad; Dr. P. P. Joshi, Pr. Scientist (Org. Chem.); Dr. (Mrs.) Sanghamitra Samantaray, Sr. Scientist (Biotech.); Mr. N. S. Rao, Scientist (Comp. Appl.); Mr. T. A. Vishwanath, AFAO and Shri V. S. Parmar, AAO 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.

Distinguished Visitors

- ❑ Prof. K. V. Peter, Vice Chancellor, Kerala Agricultural University, Trichur on 2.2.2005
- ❑ Dr. G. N. Qazi, Director, Regional Research Laboratory, Jammu on 2.2.2005
- ❑ Dr. K. V. Ramana, ADG (PC), ICAR, New Delhi on 2.2.2005
- ❑ Dr. O. P. Srivastava, Director, Institute of Agricultural

Sciences, BHU, Varanasi, on 2.2.2005

- ❑ Dr. Mangala Rai, Secretary (DARE) and Director General (ICAR), New Delhi on 12.4.2005
- ❑ Dr. G. Kalloo, DDG (Hort.), ICAR, New Delhi on 12.4.2005
- ❑ Prof. M. C. Varshneya, Vice Chancellor, Anand Agricultural University, Anand on 12.4.2005
- ❑ Dr. Mruthyunjaya, National Director, NATP, PIU, ICAR on 26.4.2005
- ❑ Dr. William Janssen, expert from World Bank on 26.4.2005.
- ❑ Dr. P. Sidhu, expert from World Bank on 26.4.2005
- ❑ Dr. Rabih Karaky, expert from World Bank on 26.4.2005
- ❑ Dr. S. L. Mehta, Vice Chancellor, Maharana Pratap University of Agriculture & Technology, Udaipur on 26.4.2005
- ❑ Dr. S. S. Savrikar, Vice Chancellor, Gujarat Ayurveda University, Jamnagar on 26.4.2005
- ❑ Prof. Premananda Das, INSA Sr. Professor, Department of Biotechnology, Indian Institute

of Technology, Kharagpur 721 302 on 26.4.2005

- ❑ Prof. Minoo Parabia, Professor, Department of Biosciences, South Gujarat University, Surat on 26.4.2005
- ❑ Dr. M. R. Heble, Project Consultant, Kelkar's Educational Trust Research Centre, Mumbai on 26.4.2005
- ❑ Dr. A. P. Singh, Member Secretary, State Medicinal Plants Board, Block No. 1, Second Floor, Dr. Jivran Mehta Bhawan, Gandhinagar on 26.4.2005
- ❑ Dr. Sokyong Lee, Associate Scientist, IPGRI – APO, Malaysia on 5.5.2005
- ❑ Dr. V. Rajagopal, Director, Central Plantation Crops Research Institute, Kasaragod on 18.6.2005

Up gradation

- ❑ Mr. C. K. Vankar's pay scale upgraded under the ACP scheme

Our New Colleague

- ❑ Ms. Deepa Bhagat, Scientist (Organic Chemistry) joined NRCMAP on 27.4.2005

Human Resource Development

| Name | Course | Date |
|---|---|-------------------|
| Mr. S. Raju, Scientist SS (Plant Physiology) | Patents Protection at New Delhi | February 8, 2005 |
| | Science Citation Index at AAU, Anand | March 14, 2005 |
| Mr. N. S. Rao, Scientist (Computer Application) | Implementation of the Global Plan of Action in India for the Conservation and Sustainable Utilisation of PGR for Food & Agriculture at NBPGR, New Delhi | March 15-16, 2005 |
| Dr. D. Kumar, Scientist SS (Horticulture) | Advances in Agricultural Research Project Management at NAARM, Hyderabad | May 5-25, 2005 |
| Dr. Ram Chandra, Sr. Scientist (Horticulture) | Leadership and Personality Development at NAARM, Hyderabad | June 17-23, 2005 |

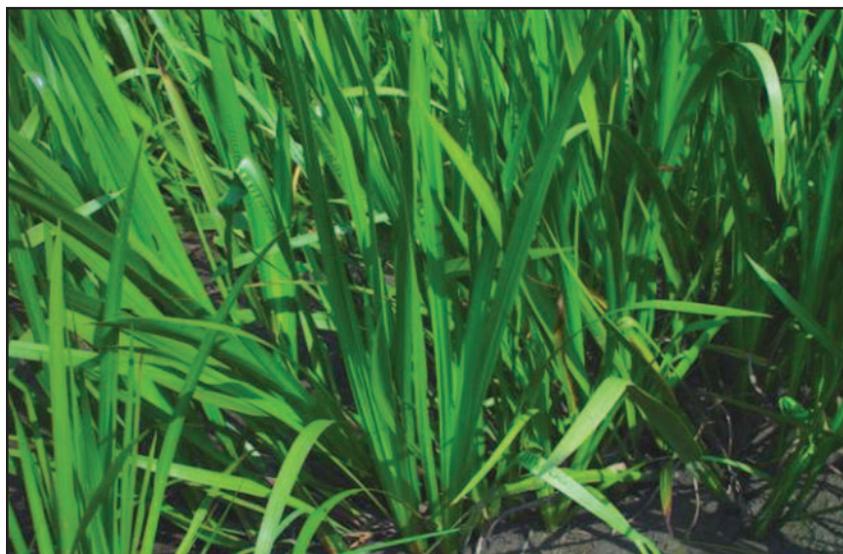
New Safed musli variety

Safed musli (*Chlorophytum borivillianum*) is an important annual medicinal crop for the Indian plains. The herb is used as general tonic. Though the crop is cultivated for few years in different parts of the country, released variety was an absentee. AINPMAP, Mandsaur has developed a high yielding line MCB-405. The line was released as Jawahar Safed Musli – 405 by State Variety Release Committee in Madhya Pradesh (MP). This is the first released variety in the country and recommended for cultivation in the Malwa plateau region of MP. Interested growers may contact Head, AINPMAP, KNK College of Agriculture, JNKVV, Mandsaur.

Two Safed musli lines registered

Two Safed musli lines selected by the scientist at NRCMAP were registered with the NBPGR. The two lines are INGR No. 04113 and INGR No. 04114. The former one (originally NRCCB-1) has long fleshy roots with blunt end having dark skin. INGR No. 04114 (originally NRCCB-2) has short (<10 cm) fleshy roots of diverged type with light skin colour. NRCMAP is engaged in further multiplication and multilocation trial of these lines.

Acorus calamus L.



The species is known as Vasa bach (Hindi), Vacha (Sanskrit, Gujarati), Sweet flag (English) or, Vayambu (Malayalam) in different languages. It belongs to family Araceae.

The plant is a perennial semi-aquatic herb with aromatic rhizomes. The leaves are simple, narrow, up to 80 cm long, glossy bright green and closely arranged. It flowers in the month of March to April. Flowers are small, white in colour, fragrant and arranged in spadix. The rhizome has strong smell, which is acrid and bitter. The dried rhizomes constitute the drug 'calamus' of commerce. Rhizomes, roots and leaves yield volatile oil known as 'calamus oil.' The main constituent (~80%) of the oil is asarone. It is used to improve memory power, intellect, digestion and also in speech therapy. It is also used in curing dysentery, diarrhoea,

headache, etc. Applying the paste of rhizome along with gold to the tongue of the newly borne babies is a practice in southern India to improve the intellect of the child.

The plant is distributed throughout the country. However, it thrives well in marshy and moist places. The species is under cultivation in parts of Andhra Pradesh, Karnataka, Tamil Nadu and Kerala. Rhizomes are used for propagation. The crop becomes ready for harvest within one year of planting.

The systematic assessment of the Red List status of the prioritised/selected medicinal plant species of southern India conducted by Foundation for Revitalization of Local Health Traditions (FRLHT) observed that the species is endangered in Kerala and vulnerable in Tamil Nadu and it is enlisted in 100 red listed medicinal plants of conservation concern in Southern India.