NATIONAL RESEARCH CENTRE FOR MEDICINAL & AROMATIC PLANTS

NEWSLETTER

Vol. 7, No. 2 July - December, 2006

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.

Contents

Group meeting of AINRPMAP held

Sixteenth group meeting of the All India Networking Research Project on Medicinal and Aromatic Plants was held at Dr. Panjabrao Deshmukh Krishi Vidyapeeth (PDKV), Akola during 30th October – 2nd November, 2006.

Dr. S. V. Sarode, Director of Research, PDKV, Akola in his welcome address in the inaugural function highlighted the contribution made by the University in popularising medicinal and aromatic plants cultivation in the state by helping the farmers to take its cultivation as an alternative crop. Dr. S. Maiti, Project Coordinator presented the salient achievements made by the various coordinating centres during last two years. Dr. K. V. Ramana, Assistant Director General (Horticulture II), ICAR highlighted the prospect of the project in the ICAR considering the future of these crops. He emphasized that number of crops be increased considering demand of large number of species. Dr. Gautam Kalloo, DDG (Hort. & CS), in his inaugural address suggested that a total shift is required in the Project focusing rural sector. He advised that every care has to be taken towards differentiating between evaluation and characterization leading to conservation and finally in developing a variety. He

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EDITORIAL

We are once again at the door of another five year plan. It's the time to look back what we targeted and what we achieved in the past. And taking the cue from the past we have to move forward with renewed vigour to finish the unfinished task of the past and realize the new expectations of the future.

International trade of medicinal plants are stand still, not increasing at a pace predicted by the Planning Commission in 2000. Although the medicinal plants are the richest bio-resource used in variety of drugs produced in traditional system of medicines, modern medicines, nutracceuticals, cosmeceuticals, food supplements, folk medicines, pharmaceutical intermediates and chemical industries. This provides employment and livelihood for large numbers of people in rural sector as well as in industrial environment. It promises enhanced employment specially in rural sector in the future to come when quality raw drug production will be the order of the day. I foresee simple Good Agricultural Practices (GAP) if made compulsory for the cultivation of medicinal plants, huge manpower will be needed for keeping records at the growers level for certification of the GAP. Farmers will not be in a position to maintain such records and it has to be on a village basis by employing graduates for the purpose. GAP has already become the order of the trade of exports of fruits, vegetable and spices.

In the XI plan we must focus on land use planning in such a way that our farmers should not produce huge surplus in medicinal plants. It creates price collapse in market. Identification of 32 targeted species for their large scale cultivation by National Medicinal Plants Board (NMPB) without estimating their market absorption demand has caused more frustration among the farmers. As a result of drastic fall in price of safed musli, kalmegh, mucuna etc. has created departure from medicinal plants cultivation by a large number of farmers. It is our learning experience, we have now to do the very focussed exercise on demand and supply and also the calculation of area needed for fill up the short supply. It has to be done species by species.

I am happy to see that Ayurvedic Drug Manufacturers Association (ADMA) has done an exercise on demand and supply scenario of Guggal gum in the country and trying to develop a mission mode programme with the help of NMPB. Similarly they are also targeting the production of Saraca asoka. *I would like to suggest the ADMA and NMPB at this point of time to do some pre-mission launching exercise on the Quality Planting Material (QPM) of these two species. Large scale planting must be with well defined QPM. Since gestation period for their harvesting is long, any mistake in selection of right QPM would lead to disaster after 10-15 years. I find some problem too in the selection of QPM. What are those? First problem is that the industry has not defined presence of what active principle(s) would be considered as quality raw drug. Once they do so, scientists should start screening of germplasm for those chemicals and select the best one for first track multiplication. Our experience of working with these two species show that wide range of variability in terms of chemical profile does exist in nature.*

Improvement of primary post harvest management at farmers level must be done on priority to improve and maintain the quality in terms of active ingredient. We have experience that in Kalmegh simple sorting of leaves and stems separately and also drying could reduce quality loss and give better price.

HRD also should get priority in medicinal plants sector. This is comparatively a new area for the farmers. For the traders, a lot of quality and safety assurance is demanded from the importers. In addition to it there will be IPR issues, more complicated in future to come. The whole sector would see a sea-change and proper HRD will be the key factor of our success in the global context.

I am hopeful that we shall fulfil the expectations of our 110 crores countrymen as a nation.

Jai Hind !

Satyabrata Maiti

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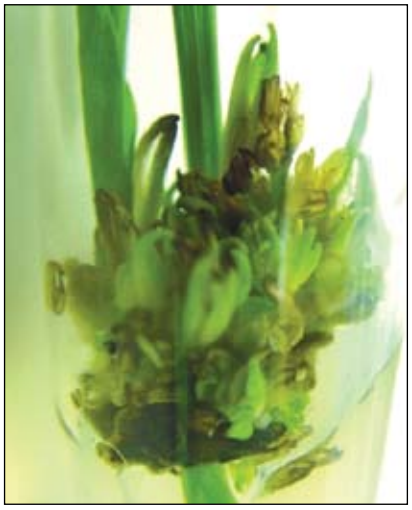
suggested to select four or five most important medicinal plants and to make a research chain for varietal development. Further, he emphasized on molecular characterization of medicinal plants. Also he reiterated that phyto-chemicals that were effective against the common ailments like rabbies, snake bites, stone formation in kidney, dog bites, scorpion bites, blood pressure, etc may be identified. Dr. Sharadraoji Nimbelkar, Vice Chancellor, PDKV, Akola in his Chairman's address, appraised the achievements made by the University. He confirmed that no stone would be left unturned for further improvement of the quality of research in MAPs. The researchers from different centres took part in the deliberations for three days. Salient outcome, recommendations and future research programmes were presented in the plenary session held on. The function came to an end with the vote of thanks proposed by Dr. S. Maiti.

Direct shoot regeneration from immature inflorescence of Safed musli

Chlorophytum arundinaceum, also known as safed musli, is a small herb naturally distributed in the North Eastern hills of India. The tuberous roots are considered as wonder drug in traditional Indian systems of medicine due to its aphrodisiac and natural tonic properties for strength and vigour. Moreover, the tuberous root of the species is specially used in the treatment of rheumatism. However, excessive collections from their natural habitats and destructive harvesting methods coupled with poor seed germination and low vegetative multiplication ratio have made this species endangered. Therefore, NRCMAP tried to develop a highly effective micropropagation technique.



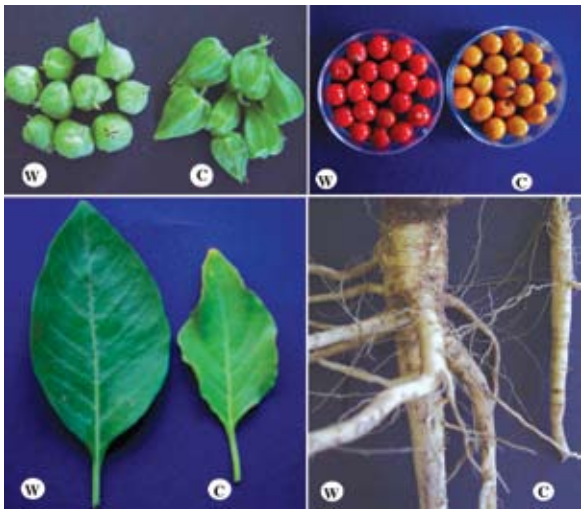
Shoot-bud developed from inflorescence

Young inflorescences were collected and the inflorescence axis with intact floral buds were cut in to three parts and used as explants. These were placed on semi-solid basal MS medium supplemented with different concentrations and combinations of BA, kinetin, adenine sulphate, IAA or NAA and 3% sucrose for shoot bud proliferation. The shoot buds developed within 2-3 weeks of culture. High frequency of shoot bud regeneration was achieved when cultured on similar medium in subsequent subcultures. The apex portion of the inflorescence produced more shoot buds as compared to the middle ones. More than 75% of the terminal segment explants produced shoot buds within 4-week of culture. Response of basal portion was negative for shoot bud initiation. Shoots rooted on half-strength basal MS medium supplemented with IAA and sucrose. Micropropagated plantlets were hardened in the green house and successfully established in the soil where 90% of the plants survived. This protocol would be useful for commercial micropropagation of this species.

Morphological comparison of cultivated and wild plant types of Ashwagandha

Ashwagandha (*Withania somnifera*) is an important medicinal plant cultivated mainly in north western region of Madhya Pradesh. Cultivated plant type is distinct from wild taxa and researchers have different opinion about the taxonomical position of the two plant types. Some local practitioners believe that the wild types are superior in therapeutic action, however, this has not yet been proved scientifically. At NRCMAP, a study was undertaken to categorise the wild plant type and the cultivated plant type (cv JA 20) morphologically.

Cultivated type was shorter in height compared to wild type. Also the leaf size was smaller and narrower in the cultivated type. Average leaf area in the cultivated type was 11.95 cm^2 compared to 40.34 cm^2 in the wild one. Leaf margin was wavy in the cultivated and it was straight in the wild type. In the cultivated type, number of leaves ranged from 128 to 208 per plant and in the wild type it ranged from 346 to 711 at the harvesting stage (four months after planting). Photosynthetic rate was comparatively higher in the wild type. However, chlorophyll contents were almost same in both the plant types. In the cultivated type, fresh weight of root per plant at harvesting stage ranged from 4.89 to 10.04 g and in the wild it ranged from 111.9 to 267.70 g. Root diameter was 8.52 mm in the cultivated and 29.37 mm in the wild. In the cultivated type, root bark thickness was 0.85 mm and root cortex thickness was 6.40 mm. While in the wild type root bark thickness was 2.49 mm and root cortex thickness was 23.51



Fruits, berries, leaves and roots of wild (W) and cultivated (C) plant types of Ashwagandha

mm. The number of fruits per plant in cultivated type ranged from 29 to 109 and 56 to 261 in the wild type at the harvesting stage. The size of fruit with calyx was 1.73x1.06 cm in cultivated type, whereas in wild type it was 1.20x1.07 cm. Berry was orange to saffron colour in cultivated and red in wild type. Seeds were larger in size in the cultivated type. Average test weight of the seeds in the cultivated type was 224 mg while it was 135.1 mg in the wild type.

Downy mildew management of isabgol with farmers' decision making power

Isabgol is an export oriented medicinal crop of India. Its commercial cultivation is restricted to the drier western states *viz.* Rajasthan, Gujarat and Madhya Pradesh. Downy mildew is the major disease causing yield reduction in this crop. In the absence of any resistant variety against this disease, chemical management remains the option left for the farmers. Considering farmers' field condition and their decision making power, different fungicidal spray schedules were tested at NRCAMP for management of downy mildew. Application of 0.2% combination fungicide of metalaxyl and mancozeb after onset of disease followed by at least one more spray of 0.3% mancozeb after 12-15 days reduced the disease severity significantly. This schedule also increased the seed yield considerably compared to unsprayed one. Thereby it maximised the net return. Fungicide residues in seed were measured. Metalaxyl residue could not be detected. However, mancozeb residue was only 0.29 g per kg seeds after spraying of combination fungicide followed by one mancozeb application. The residue was too low to be considered risk factor for human consumption.

Production technology of Chitrak developed

Red chitrak (*Plumbago rosea*) is valued for stimulating action on nervous system and also used in skin diseases in the indigenous system of medicine. Root is a constituent of '*Dasamula*'. Hence, production technology for this species was worked upon at AINRPMAP, Trichur. Evaluation of 25 different accessions revealed that the collection from Ernakulam produced maximum root yield. Maximum plumbagin content was 2.20% among the accessions. Plants having ovate type of leaves were found to produce higher root yield. Application of FYM at the rate of 10 t/ha along with 0.5 g of azospyrillum and phosphate solubilising bacteria per plant maximised root yield and plumbagin content. Frequent irrigation, approximately 10 days intervals, to maintain IW:CPE of 1.0 was found to increase the plant growth. This could produce the root yield of 2.1 t/ha.

Chemical fingerprinting to distinguish adulterant in asoka

Asoka or Sita-asok (*Saraca asoka*) is a medicinal tree, bark of which is in high demand in the industry. However, *Polyalthia longifolia*, also commonly known as asoka, is often used as an adulterant. To distinguish these two, AINRPMAP Trichur developed a thin layer chromatography (TLC) method. Shade dried bark samples of these species were powdered and extracted with methanol. The methanolic extract was spotted on silica gel TLC plate and developed with either chloroform:acetic acid (9:0.1) or, chloroform:diethyl amine (9.01). Plates were then sprayed with dufferent colouring reagents (vanillin-H_2SO_4, dragendorff, Foiln-Ciocalteau) and viewed under UV. Fingerprints thus developed clearly distinguished these two plants.

Group meeting of AINRP on Betelvine held

The 21st Group meeting of the AINRP on Betelvine was held at Assam Agricultural University, Jorhat. In the inaugural session, Dr. A. K. Pathak, Director of Research, AAU, welcomed the delegates and thanked the ICAR authority for choosing AAU for this group meeting. In his address he gave a brief description of the prospects and opportunities of Betelvine cultivation. Dr. K. V. Ramana, ADG (Hort. II), ICAR presented prospect of the project at length and reaffirmed the cooperation of ICAR for making such an old network more result oriented and also assured that in the event of AINRP on Betelvine getting merged with the AINRP on Medicinal & Aromatic Plants, ICAR would strengthen the already existing set up. Dr. Satyabrata Maiti, Project Co-ordiantor, AINRP on Betelvine presented salient achievements made by the various coordinating centers during 2004-06. Dr. S. S. Baghel, Vice Chancellor, AAU, Jorhat delivered the inaugural address. He was overwhelmed at the success of this 25 years old project and expressed his surprise of the achievements made by the project. He informed that it was a rarest opportunity for him to get an exposure of such a wonderful crop. He expressed that betelvine could play wonder in upliftment of our social as well as economical status. The inaugural session ended with the vote of thanks proposed by Prof. P. K. Dutta, Head, AINRP on Betelvine, AAU, Jorhat.

QRT on AINRPMAP and AINRP Betelvine Constituted

The Indian Council of Agricultural Research has constituted Quinquennial Review Team (QRT) for AINRPMAP and AINRP Betelvine to review the research and development work under these two projects. The QRT will review the work done for the period of last seven years i.e. from 1.1.1999 to 31.3.2006.

QRT of AINRPMAP is also empowered to review the progress of NRCMAP. The team is headed by Dr. B.R. Tyagi, retired Joint Director, CIMAP, Lucknow. Dr. R. Krishnan, Dr. Shiam Varshney, Dr. C.S. Tyagi and Dr. V.K. Agarwal are hounrable members of this committee.

QRT of AINRP on Betelvine has been constituted under the Chairmanship of Dr. S.P. Ghosh, Former DDG (Hort.) ICAR. Dr. N.K. Mohan, Dr. P. Parvatha Reddy, Dr. S.V. Sarode and Dr. O.P. Pareek are distinguished members of this committee.

The NRCMAP and AINRPs hope to receive enlighting suggestions for future growth.

From the Institute

Our New Colleagues

- Mr. A.P. Trivedi, T5 (Technical Officer), Joined on 03.07.06
- Mr. J.S. Vasava, SS Gr. I

Distinguished Visitors

- Dr. Mohammed Hassan Al-Masry, Deputy Director of Horticulture Research Institute, Agricultural Research Centre (ARC) for Extension & Training, Cairo, Egypt during 14th – 30th September, 2006.
- Dr. V. V. Sadamate, Advisor (Agriculture), Planning Commission, Government of India, New Delhi on 7.10.2006
- Dr. Ashok A. Patel, Director of Extension Education, AAU, Anand on 7.10.2006
- Dr. Adriana R. Alercia, Germplasm Information Specialist, IPGRI, Rome, Italy on 12.10.2006
- Dr. R. N. Pal, Ex-DDG(Hort.), ICAR on 30.11.2006
- Dr. S. D. Sharma, Director, IASRI, Pusa, New Delhi on 2.12.2006
- Dr. S. N. Saha, Former Joint Director, NAARM, Hyderabad on 2.12.2006
- Dr. D. J. Patel, Former Principal & Dean, BACA, AAU, Anand on 2.12.2006
- Dr. A. M. Shaikh, Principal & Dean, BACA, AAU, Anand on 2.12.2006
- Dr. P. H. Bhatt, Former Director of Research, GAU, Anand on 2.12.2006

Human Resource Development

Name	Course	Date
Dr. Manish Das, Sr. Scientist (Plant Physiology)	Training on DUS testing of Essentially derived and special purpose varieties at IARI, New Delhi	5th – 14th September, 2006
	Training on Basic seed standards at IARI, New Delhi	14th – 16th September, 2006
Dr. O. P. Aishwath, Scientist (Sr. Scale) (Soil Sciences)	National Seminar on Development of soil science – 2006 & 71st Annual Convention of ISSS	10th – 13th November, 2006
Dr. Gutam Sridhar, Scientist (Plant Physiology)	International Seminar on Intellectual Property Education and Research at NALSAR University of Law, Hyderabad	16th – 17th November, 2006
Mr. N. S. Rao, Scientist (Sr. Scale) (Computer Application)	Workshop on Right to Information Act at ISTM, New Delhi	4th -8th December, 2006
Dr. K. Mandal, Scientist (Sr. Scale) (Plant Pathology)	Winter School on Molecular detection of seed borne disease and seed health status as global perspective at AAU, Anand	12th December 2006 to 1st January, 2007

Our new DDG

Dr. H. P. Singh, a renowned horticulturist by profession, has joined as Deputy Director General (Horticulture) on February 5, 2007. Dr. Singh was born in Pusa, Samastipur of Bihar in the year 1951. He did his B. Sc (Ag.) from RAU, M. Sc (Ag) in Horticulture from BHU and Ph.D. in Horticulture from UAS, Bangalore. He has colourful professional career spanned over 33 years. Before joining as DDG, he served in various capacities including Director, NRC-Banana; Horticulture Commissioner; Dean of Agriculture, GBPUAT; Vice-Chancellor, RAU. He is widely travelled research manager with experience of visiting 30 countries. Dr. Singh has transformed the system wherever he worked with his apt managerial skill. He has published about 175 research papers and book chapters apart from authoring many books, bulletins, technical reports and popular articles. His mission is to improve the quality of life of people through technology-led horticulture development. He believes "even the Best can be improved."

Members of the NRCMAP and AINRPMAP families congratulate Dr. H. P. Singh and look forward to his continued success.

Threatened Plant

Oroxylum indicum (L.) Benth. Ex Kurz.. = *Bignonia indica* L.

Oroxylum indicum is a tree belonging to family Bignoniaceae. The species is known as Indian trumpet flower, arlu, syonakah, etc. It is distributed globally in India, Sri Lanka, Myanmar, Malaysia and Malacca. In nature the species grows well in dry deciduous to moist deciduous forests. In India, the tree is distributed in warmer parts up to an altitude of 1200 m.

The species is a medium sized tree growing 5-10 m tall and about 75 cm girth. Bark surface is rough and brownish grey. The wood is yellowish white with prominent corky lenticels. Leaves are opposite 2-3 pinnate. Flowers are bisexual arranged in large terminal racemes. Capsules are large, flat linear of about 50-100 x 8-10 cm in size and tapering at both ends. Flowering is generally found in July to November and fruiting in December to July.

Most parts of the tree are used medicinally. The fresh root bark is an ingredient of the well-known Ayurvedic compound formulation 'Dasamula' (ten roots). It is hot, bitter, astringent, carminative, aphrodisiac and tonic. It is used for stimulating digestion, curing fevers, coughs and other respiratory disorders. Stem bark is used to treat fever and leprosy. The tender fruits are refreshing and considered stomachic and anthelmintic. Seeds are purgative. Leaves are applied to relieve joint pains.

The plant is propagated mainly by seeds. The distribution of the species is reduced in its natural habitat due to the ruthless collection for the raw drug, habitat loss, etc. Conservation attempts are required for the sustainability of the species and the species has already enlisted as vulnerable to endangered in southern parts of India especially in Karnataka and Kerala.

Editor : Dr. Satyabrata Maiti, Director
Associate Editor : Dr. Kunal Mandal, Scientist (Senior Scale) (Plant Pathology)
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