DIRECTORATE OF MEDICINAL AND AROMATIC PLANTS RESEARCH

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NEWSLETTER

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About the Newsletter

The Directorate of Medicinal & Aromatic Plants Research (DMAPR) is one of the institutes of the Indian Council of Agricultural Research (ICAR). DMAPR'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 Co-ordinated Research Project on Medicinal & Aromatic Plants and Betelvine (AICRPMAP&B).

AICRPMAP&B works in partnership with State Agricultural Universities and other organisations, 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 DMAPR and AICRPMAP&B.

Contents

Dr. S. Ayyappan, DG, ICAR visited DMAPR

Dr. S. Ayyappan, Director General (ICAR) and Secretary (DARE) visited Directorate of Medicinal and Aromatic Plants Research (DMAPR), Boriavi on April 4, 2010. He was taken to the Field Gene Bank maintained at Lambhvel campus by Dr. Satyabrata Maiti, Director, DMAPR. He appreciated the efforts of DMAPR in conservation of guggal and ashoka germplasm which are vulnerable species at the moment. He suggested that quality raw drug supply and a few products from the institute should be second step for commercialisation of medicinal plants which would make the Institute more visible. Dr. Ayyappan planted ashoka (*Saraca asoca*) sapling as a symbol of developing GREEN INDIA, GREEN ICAR. He then visited the experimental fields of the main campus at Boriavi. He met the field staff and appreciated them for their sincere efforts in maintaining the farm in such a good condition. He expressed his happiness for the facilities available at Institute and the quality work done by the scientists and discussed with them. Later in the evening, he met all the staff members of Institute in a general gathering and addressed them with wide ranging suggestions for the betterment of the institute. He asked all to increase the visibility of the institute to outside world. For doing so, he suggested to take initiative in making linkages with farmers and industries. He advised, if needed, to arrange a brain storming discussion involving experts from all stake holders. He expressed that this would be helpful in drawing the path for our future progress. He also felt that clear understanding

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EDITORIAL

Challenges in MAP Sector

I have great pleasure in welcoming you through this editorial at the 11th year of this Newsletter. It is undoubtedly a great moment for all of us who have been part of this inspiring journey through the All India Coordinated Research Project on Medicinal and Aromatic Plants to National Research Centre for Medicinal and Aromatic Plants to Directorate of Medicinal and Aromatic Plants Research which are momentous landmarks in the history of Medicinal and Aromatic Plants Research under the auspices of the Indian Council of Agricultural Research. It is indeed a matter of great satisfaction that together we have built a national institution that will continue to create growing value for all the Indians of tomorrow with one aim in mind i.e. ***health for all****. Newsletter has been the vehicle of dissemination of the research highlights and shall continue to do so in future too with greater zeal.*

The importance of the Medicinal and Aromatic Plants (MAP) sector is growing more and more due to increase in strong world demand during the last decades for MAP products on one hand, and increasing number of users and diversity of MAP enhancement fields on the other hand. This trend offers real development opportunities for India, through the adoption of an appropriate policy on MAP utilization, sustainable management, and enhancement for future. MAP are undeniably high value natural resources which contribute in improving the level of living by providing health care and additional income to the deprived populations, particularly the forest dwellers and a number of tribes depending on forest resources. But despite these promising prospects and opportunities, a large number of constraints still obstruct the growth of the MAP sector to harvest its full potential. In order to face these constraints and take advantage of available opportunities, it is necessary to develop and implement a consistent national master plan to ensure the harmonious sustainable development of the sector.

There is no denying of the fact that without a sound master plan and a participatory approach involving all stakeholders, it will not be easy to achieve the growth in this sector. The National Medicinal Plants Board was created almost a decade back for this purpose to bring all the stakeholders in one platform and sort out the constraints of various stakeholders in an expeditious manner. Although the Board has started organizing dialogues between various stakeholders, outcome is yet to be felt in terms of export and livelihood generations. The progress is in snail speed because of lack of professionals available in the sector. So far the sector was getting the lip-sympathy but in real sense adequate Human Resource (HR) was not made available. Not only that, there is no planning for HR requirements of the sector in the next decade, but also no planning exists for how to make the HR available for the various sectors. This requires a sound planning and needs serious attention of the planner.

Recently, NMPB has rightly developed the Good Agricultural Practices and Good Field Collection Practices (GAP&GFCP) as per the requirement of the world market. Quality Council of India has further put their expertise to develop certification standards which are to be used by the Certification Agencies. This process will now set in chain reactions and lot of activities need to be organized to make the process effective such as awareness programme, training programme on GAP, GFCP, primary processing, packing & storage, hygiene, etc. These activities require huge qualified manpower and there must be serious planning to make such qualified manpower available for a size of country like India.

Heartening part of this process is that there will be job opportunities in the sector to fulfil this GAP & GFCP compliance. It is my firm conviction that there will be tough future competitiveness in the sector and therefore its ability to increase the productivity and profitability in the sector will crucially depend on the ability of the stakeholders to make sustainability an integral part of their value system. The society will anxiously look forward to this sector to meet the challenges of providing good health and poverty alleviation through the creation of sustainable livelihoods.

Jai Hind!

Satyabrata Maiti

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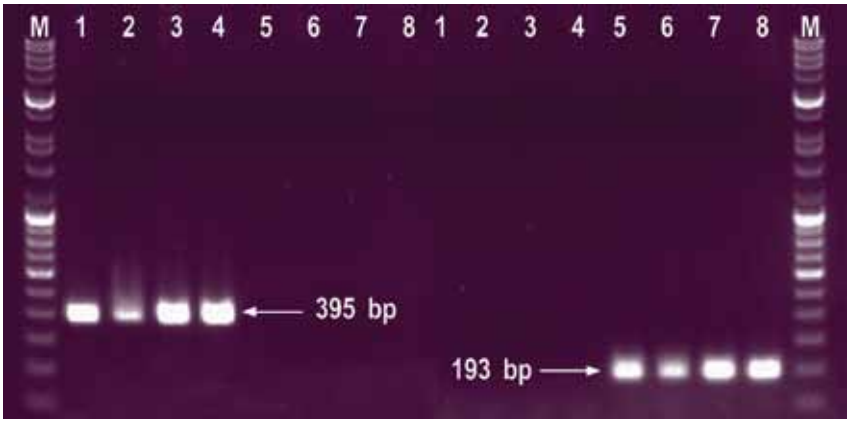
about the need of the clientele, working on those aspects and dissemination of the technologies developed at the institute were necessary to meet the public expectations. He advised, in absence of social scientists at the institute, these work could be outsourced to meet the demand. He also suggested that the institute should target to develop technologies to utilise the waste and degraded lands for cultivation of the medicinal plants. He expressed his displeasure to know that the institute was not given chance to train its manpower through foreign visits. He wished, all success for the institute. The meeting came to an end with the vote of thanks proposed by Dr. V. S. Rana, Sr. Scientist (Organic Chemistry).

SCAR markers for detection of adulterant in ashoka



Amplification of species specific markers. 1-4=*P. longifolia*, 5-8=*S. asoca*

Ashoka (*Saraca asoca*) is a medium sized, evergreen tree distributed throughout India particularly in humid areas. Hindus and Buddhists consider it as a sacred tree. Asoka bark is widely used in Indian system of medicines for the treatment of all female ailments. Flowers are also used for the treatment of bleeding piles and skin diseases. The activity of the drug is due to the presence of steroidal component and calcium salt. Bark also contains tannins. The increased demand of the raw drug in recent years has caused overexploitation of the species in wild habitats. As a result, bark of *Polyalthia longifolia*, also commonly called as ashoka, is widely used as adulterant.

AICRP, Thrissur studied the differentiating characters of bark samples from these two species. Inner side of the *S. asoca* bark is reddish with smooth vertically arranged fibres. But, the other species was yellowish brown in colour with criss-cross fibres. But, bark powder from both the species was identical in appearance. Hence, chemical tests were resorted to distinguish between these two. Water extract of the powder from *P. longifolia* showed milky greenish fluorescence under UV light while true drug had no fluorescence. *S. asoca* bark powder extracted in phosphate buffered saline had haemagglutination properties but the adulterant was negative for this character. However, these characters could distinguish the two products individually, not as mixed sample. Therefore, a DNA based rapid detection technique was attempted at DMAPR. A protocol for total genomic DNA isolation from the fresh leaves and dry bark powder of both the species was standardised. Species specific RAPD bands of both the species were cloned and sequenced. Sequence characterized amplified region (SCAR) markers were designed from the sequences of corresponding species-specific RAPD amplicons. SCAR primer designed from *S. asoca*, produced the expected amplified product, having a size of 193 bp from *S. asoca* only. Meanwhile, no amplicon was generated in *P. longifolia*. SCAR marker designed from *P. longifolia* amplified a product of 395 bp from *Polyalthia* whereas no amplicon was found in *S. asoca*. The technique could detect adulterant in a mixed sample as well.

Hada beetles on ashwagandha – where from they come?

Ashwagandha (*Withania somnifera*) is a wonder herb with multiple medicinal benefits. It is a stress reliever, immunomodulator and used against senile dysfunctions, anxiety, depression, phobias, alcoholic paranoia, schizophrenia, etc. Steroidal alkaloids and steroidal lactones present in the roots are the active ingredients. Traditionally it is cultivated in western Madhya Pradesh. However, increased demand resulted in spread of its cultivation in different parts of the country as post kharif crop. At DMAPR, Anand spotted Hada beetles (*Epilachna vigintioctopunctata*) is a major pest of the cultivated ashwagandha. Year long observations suggested that on cultivated ashwagandha, the insect activity started from 3rd week of October and peaked during the 4th week of October, after that started declining. Pest population was almost nil by the end of December. It was again seen during 2nd week of February, that too on young plant parts and lasted up to crop harvest (April). Disappearance during winter and reappearance at spring could be due to hibernation of the pest between December and January. This was concluded from an insect proof encroachment under field conditions. However, source of insects for first appearance on the crop after sowing was not known. Observations on other solanaceous weeds suggested, these could be alternative host for the beetle in the absence of the crop. On *Datura metel, Datura alba, Solanum surrattens, S. nigrum* and wild ashwagandha the activity of beetle was observed from 2nd

week of July. During this period the adults laid eggs and built population on these plants. The activity of beetle on these weeds lasted up to 2nd week of October. It was also observed that under laboratory conditions, cultivated ashwagandha leaves supported better growth for the Hada beetle compared to these solanaceous weeds. Possibly, these species act as reservoir for Hada beetle during lean period, from where they move on the cultivated crop during October.

DWS 327: A dwarf line of Ashwagandha

Cultivated plant types of ashwagandha (*Withania somnifera*) grow 60–90 cm in height at Anand conditions. At DMAPR, Anand a line (DWS 327) with height of 20-25 cm was identified. From an open pollinated population of JA-134, 150 single plants were selected during Kharif 2006. In the next season, plant-to-progeny rows were raised and selections were repeated. After subsequent two years of purification from plant-to-progeny rows, this stabilised dwarf line was identified. It had average plant height of 21.3 cm, 19.3 cm root length, 5.94 mm root girth (middle), 3.47 mm stem girth, 3 primary stem branches and a harvest index of 45.96%. DWS 327 matured in about 130 days after sowing. Also RAPD finger prints distinguished this line from its parent (JA-134). This may be used as a dwarf line/parent for developing high yielding dwarf ashwagandha varieties with early maturity.

Giloe germplasm differs in starch content and granule size

Giloe (*Tinospora cordifolia*) is a deciduous perennial climber found throughout tropical India. Its stem is a constituent of a number of *Ayurvedic* vital tonics. It is used against general debility, dyspepsia, fevers and urinary diseases. Starch present in the stem along with alkaloids is the active principle of the species. Stems from one year old plants become ready for use as raw drug. An attempt was made at DMAPR to screen 43 different accessions for starch content and its quality. Fresh stem yield from 18 months old plantation varied from 0.09 to 5.44 kg/plant and dry stem yield varied from 0.03 to 1.43 kg/plant. Stem starch content varied from 12 to 52% on dry weight basis among the accessions. Based on abundance of a particular starch granular size (perimeter) in each accession, the germplasm was classified into five classes. Very small starch granules had perimeter of 15–45 μm; in 'small' class, perimeter was 46–75 μm; in 'medium' class, it was 76–105 μm; while 'big' and 'very big' granules had 106–135 μm and 136–165 μm perimeters, respectively. Majority of the accessions were having small starch granules.

Farm yard manure is the best organic source for *Leptadenia reticulata*

Jivanti (*Leptadenia reticulata*) is a perennial climber. Its natural distribution includes sub Himalayan tracts of India mainly in Punjab and Uttar Pradesh and throughout Deccan peninsula up to an elevation of 900 m. It is useful to cure eye-diseases, seminal debility, general weakness, etc. It promotes health and vigour, improves voice and alleviates the three 'doshas' *vata*, *pitta* and *kapha*. The raw drug is collected from the wild and survival of natural population is under threat. Hence, to develop cultivation practices, herbage yield at different nutrient doses were measured at AICRP, Anand. Six different organic manures – FYM, poultry manure, vermicompost, castor cake, neem cake and Azotobacter along with phosphate solubilisation bacteria were applied. Above ground parts were harvested at 90 and 180 days after sowing. Highest dry herbage yield of 6780 kg/ha was obtained from application of 10 t/ha FYM. This was closely followed by 2 t/ha castor cake (6038 kg/ha) and 5 t/ha poultry manure (5876 kg/ha).

New pest of *Tylophora indica*

Tylophora indica, commonly known as *dumvel* is a slender, much branched, tough laticiferous climber. It is found throughout the country in hedges and open forests up to 900 m altitude. The roots and leaves are found to be useful in curing asthma, bronchitis, whooping cough, dysentery, etc. The plant at DMAPR was found seriously infested by a semi looper, *Dichromia orosia*, Noctuiidae: Lepidoptera. The pest remained active throughout the year and maximum damage was observed during June–August and late December–January. The early stage larvae started feeding on green matter of lower leaf lamina and leaving the epidermis intact giving blotching appearance. However, the later instars fed voraciously and defoliated the leaves leaving the midribs and veins. At times of dearth of leaves, they even gnaw the green tissues of midribs and veins. The caterpillars passed through 5 instars in about 12.5 days. The adults were medium sized moths with pale brown fore-wings having dark brown band at the centre. The hind wings were yellow with pale brown margin.

The female laid pale yellow, hemispherical, sculptured eggs on the lower lamina or tender twigs, which hatched in 3–4 days.

New disease reports on *Asparagus racemosus*

Satavari (*Asparagus racemosus*) is a trailing plant distributed all over the country. Fleshy roots are used as drug after peeling. Satavari is considered to be the main Ayurvedic rejuvenating female tonic for overall health and vitality. It belongs to the *rasayana* drug meant for general well being by increasing cellular vitality. An attempt of cultivation through seed was made at AICRP, Faizabad. However, during hot and humid conditions of August–September a collar rot disease became serious problem in the nursery. High soil moisture aggravated the problem. The symptoms first appeared as water soaked lesions at the collar region. Gradually the lesions became brown in colour and enlarged girdling the stem. Finally the infected seedlings toppled from collar. During early morning, brownish mycelial growth was observed at the necrotic portions of the seedlings. The disease was caused by *Rhizoctonia solani*.

Another fleshy root rot disease was also observed at Faizabad. The disease was prevalent mostly in older roots of one year or more age. The disease initiated as small brown discolouration on the surface of the roots. The brown spot that appeared at the root tip gradually proceeded upward. The older portion of the infected region turned grey with blackish spots over it. The infected portion of the root shrank. Root skin remained intact but became hollow with no content. The disease initiated in field but caused maximum damage in storage. It was caused by *Fusarium solani*.

From the Institute

Distinguished Visitors

- Sh. Rajiv Mehrishi, Additional Secretary, DARE & Secretary, ICAR, New Delhi on 19.1.2010
- Dr. S. P. Singh, Former Director, PDBC, Bangalore on 2.2.2010
- Sh. Raj Ganguli, MADP Project Coordinator, FAO, New Delhi on 9.2.2010
- Dr. O. M. Bambawale, Director, NCIPM, New Delhi on 19.2.2010
- Dr. O. M. Prakash, Chief Consultant (NHM), DAC, New Delhi on 20.2.2010
- Dr. B. C. Viraktamath, Project Coordinator, AICRP on Rice Improvement, DRR, Hyderabad on 8.3.2010
- Dr. S. Ayyappan, Secretary (DARE) & DG (ICAR), New Delhi on 4.4.2010
- Dr. Swapan K. Dutta, DDG (CS), ICAR, New Delhi on 5.4.2010
- Dr. S. K. Sharma, Director, NBPGR, New Delhi on 5.4.2010
- Dr. T. K. Adhya, Director, CRRI, Cuttack on 5.4.2010
- Prof. P. K. Aggarwal, ICAR National Professor, New Delhi on 5.4.2010
- Dr. C. Devakumar, ADG (EPD), ICAR, New Delhi on 26.4.2010
- Dr. Bangali Baboo, ND, NAIP, ICAR, New Delhi on 25.5.2010
- Dr. Mohinder S. Mudakar, World Bank, Washington, DC, USA on 25.5.2010

New Colleagues

- Mr. Nagaraja Reddy, joined as Scientist (Plant Breeding) on 24.4.2010
- Dr. Biraj Bandhu Basak, joined as Scientist (Soil Science) on 24.4.2010

Transfers

- Dr. L. Saravanan, Scientist (Entomology) transferred to Directorate of Oil Palm Research, Pedavegi on 26.02.2010.
- Dr. S. Samantaray, Senior Scientist (Plant Biotechnology) transferred to Central Rice Research Institute, Cuttack on 07.05.2010.

Human Resource Development

Name	Course	Date
Dr. (Mrs.) Sanghamitra Samantaray, Sr. Scientist (Biotechnology)	Workshop on Tissue Culture Technique for growing of *Aloe vera* at NEDFI R&D centre on MAP, Nagicherra, Agartala	February 15–23, 2010
Mr. Vinay Kumar, Scientist (Biotechnology)	Training on Molecular tools for crop improvement at ICRISAT, Pattancheru, Hyderabad.	May 9–22, 2010
Mr. N. Srinivasa Rao, Scientist (SS), Computer Application	NAIP consortium workshop on Developing, Commissioning, Operating and Managing an online system for NET/ARS – Prelim Examination for ASRB, ICAR at New Delhi.	June 30 – July 1, 2010

National Conference on MAP

MAPs constitute one of the integral parts of the biodiversity, ecosystem and biological heritage. More than one decade after the implementation of the Convention on Biological Diversity, the recognition of biodiversity loss has gained lot of attention. The United Nations proclaimed 2010 as the International Year of Biodiversity and people all over the world are working to reduce biodiversity loss. Medicinal and Aromatic Plants Association of India (MAPAI) in association with DMAPR, Anand and Biodiversity International, New Delhi is organising a National Conference on Biodiversity of Medicinal and Aromatic Plants: Collection, Characterisation and Utilisation during November 24-25, 2010. This will provide opportunities to the researchers to share the knowledge on global issues and initiatives on MAPs. The thematic areas of the conference are:

- Plant genetic resources in MAPs (MAP-PGR)-Authenticity of the MAP species, its documentation, conservation and sustainable collection
- Characterization of the wealth of PGR in MAPs using morphological, biotechnological and phytochemical tools
- Utilization of MAP-PGR following Good Agricultural Practices
- Quality assessment and value addition in MAPs
- Legal issues and policies related to IPR management in MAP-PGR

The organising committee calls for full length papers and abstracts for Lead lectures and Poster presentations latest by October 15, 2010. Other details are available at www.dmapr.org.in.conference.

Species of Conservation Interest

Chandan (*Santalum album* L.)

The plant belongs to family Santalaceae and commonly known as 'chandan' or 'chandana'. It is a semi-parasitic evergreen tree which requires the support of other plants in the initial growth stages. The plant is distributed in plains and foothills of deciduous forests up to an altitude of 50-1400 m. It is a medium sized tree grows up to 6-15 m. Heartwood of the tree popularly known as chandan wood or sandal wood is brownish yellow and pleasantly scented. Globally the species occurs in peninsular India, Malaysia and Indonesia. Karnataka is well known for its quality chandan trees. Although the species is introduced to other states such as Rajasthan, Madhya Pradesh and Orissa, the chandan wood produced from these areas are inferior in quality. There are different opinions regarding the origin of the species; some believe that the species is indigenous to peninsular India and some believe that it is introduced to India from Indonesia. However, there are evidences of sandal wood use in India for more than last 23 centuries. Flowers are bisexual, arranged in paniculate cymes. Flowering occurs during November to April. Trees of about 20 years and more are ready for harvesting. Heartwood is used to treat intrinsic haemorrhage, bleeding piles, vomiting, diabetes, eye diseases and inflammations. It is also used to treat skin ailments. Oil extracted from the heartwood is used to cure dyspepsia, perfumery and toiletries. India is one of the major exporters of sandal wood oil. The species is propagated by seeds. Since the species is highly profitable one, the natural population face lot of pressure and it is classified as vulnerable in Karnataka and as endangered in Kerala and Tamil Nadu as per the survey conducted by Foundation for Revitalization Local Health Traditions (FRLHT), Bangalore.

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