



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

XVIII Group Meeting of AICRPMAP&B	1
Editorial	2
Breakthrough & Research Highlights	3
National Conference.....	5
From the Institute.....	5
Vallabh Medha- A high yielding cultivar of Centella asiatica.....	6
Species of Conservation Interest.....	6

XVIII Group Meeting of AICRPMAP&B



The XVIII group meeting of AICRPMAP&B was held at Mahatma Phule Krishi Vidyapeeth (MPKV), Rahuri during 8-11 November, 2010. The inaugural session started with welcome address by Dr. S. G. Borkar, Head, Department of Plant Pathology, MPKV. Dr. Satyabrata Maiti, Project Coordinator presented the salient achievements made by 61 scientists at the 22 Coordinating centres spread all over the country. Identification of unique germplasm of chirayta (*Swertia chirayita*) at Solan, development of production technology for bala (*Sida cordifolia*) at Trichur, detection of pathogenic *Cylindrocladium* sp. in root rot disease of opium poppy at Udaipur and interspecific hybridisation in betelvine at IIHR, Bangalore were some of the major achievements, he highlighted. The Project Coordinator also informed that centers working on betelvine undertook large scale

demonstration of integrated crop management at farmers' field.

Dr. Subhash Mehetre, Director of Research, MPKV in his presidential address expressed his thankfulness to the ICAR for giving an opportunity to host this group meeting at Rahuri. He informed that in India about 960 species of medicinal plants are estimated to be in trade of which 178 species have consumption levels in excess of 100 t. He further informed that the domestic trade of AYUSH industry is ₹ 80 to 90 billion. The Indian medicinal plants and their products also account about ₹ 10 billion in export. He suggested that to improve production of medicinal plants farmers are need to be motivated which could be achieved through measures like establishing well organised markets, providing quality

...Continued at page 2

EDITORIAL

Forest is vital for the survival of any living being. Forests cover 31% of total land area; 30% of forests are used for production of wood and non-wood products; Trade in forest products was estimated at \$327 billion in 2004; Primary forests account for 36% of forest area.

2011 has been declared as International Year of Forests by the United Nations. A logo has been designed to convey the theme of "Forests for People" signifying the central role of people in the sustainable management, conservation and sustainable development of our world's forests. The iconographic elements in the design depict some of the multiple values of forests and the need for a 360° perspective: forests provide shelter to people and habitat to biodiversity; are a source of food, medicine and clean water; and play a crucial role in maintaining a stable global climate and environment. All of these elements taken together spread the message that forests are vital to the survival and well being of all creatures including human being everywhere, all 7 billion of us.

Environmental experts and world leaders are of the opinion that sustainable management of forests is in the interest of human development as the United Nations Forum on Forests began International Year of Forests, 2011. People-centred forestry and financing are the need for forest communities. It is the time to realize the full potential of forests - for sustainable development, economic stability, the fight against poverty and health related problems and our efforts to ensure future prosperity for all.

We have to eradicate poverty, but not the forests, the International Year, hence aim to raise awareness of the importance and methods of forest management, conservation and development of all types of forests in the interest of sustainable development, poverty reduction and maintaining a breathable atmosphere.

Ms. Maathai, Nobel Laureate and United Nations Messenger of Peace for Environment and Climate Change, said human civilization had always been intertwined with trees. Forests were the bedrock of biodiversity, providing many environmental services, she stressed, warning that the loss of their resources threatened the peace.

Describing sustainability as "the mother of all other Millennium Development Goals", she said that improving income in the short term through destructive logging, charcoal-burning, settlement and agricultural conversion only exacerbated long-term financial and economic challenges with the onset of natural disasters and the loss of resources. "The gods are not to blame," she emphasized. "Many disasters are man-made and preventable. Governments have a responsibility to ensure that the ecological services provided by trees and forests are available for the common good of all communities, including future generations."

Forest farming is now considered to be the best approach for the livelihood of millions in most of the developed countries. In forest farming, there are two principle approaches; first is to intensively grow plants in beds, commonly referred to woods-cultivated approach; other system is to sow seed or planting propagules (rhizomes, tubers, bulbs, etc.) in a manner that attempts to imitate wild conditions, known as wild-simulated approach. In short, the woods-cultivated approach requires more labour and farm implements and equipments because it involves intensive production techniques, such as, use of raised beds, fertilizers and pesticides. The wild-simulated approach, conversely, follows a less-intensive strategy that may involve nothing more than the planting of seed, seedlings or vegetative propagules. In India 90 percent of medicinal plants requirement to industry is met with supply from the forests.

It is becoming more and more clear now that to increase adoption of forest farming of medicinal plants, profitability must be increased. The following strategies may be adopted to increase profitability: (1) reduction in production costs; (2) an increase in per unit area yield; (3) an appreciation of the true cost of production in the marketplace (perhaps through certification); and/or (4) by persuading niche markets by forest farmers.

Lets start the international year with awareness programme with a slogan "Protect Forest or Breathe your last".

Jai Hind!

Satyabrata Maiti

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planting materials and agro-techniques, etc.

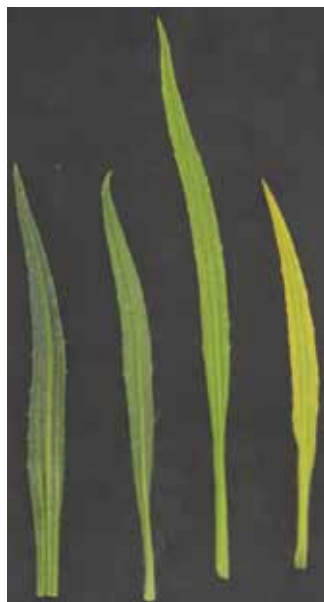
Scientists from the participating centres presented their experimental results during three days of deliberations in four different technical sessions. Technical programmes for the next year were formulated after thorough discussions.

The plenary session was held on 11 November under the chairmanship of Dr. Vijay Mehta, VC, MPKV. Reports of all the technical sessions were presented and approved after thorough discussion. The chairman released a new variety of *Centella asiatica* "Vallabh Medha" for general cultivation and congratulated the team who developed it. He also released the hand out of "Vallabh Medha". In the end of the session, Dr. S. Maiti felicitated the chairman and co-chairman of the technical sessions by presenting memento. The programme came to an end with the vote of thanks proposed by him.

Breakthrough & Research Highlights

Distinct and stable leaf colour mutants of Isabgol identified

Isabgol (*Plantago ovata*) is an important medicinal plant mainly used as laxative world wide and India is the sole exporter of this crop to the world market. It is cultivated in arid and semi-arid regions of Gujarat, Rajasthan and parts of M.P as winter season crop. Variability in this crop is said to be limited owing to narrow genetic pool in our country. Hence, the attempts were made at DMAPR to create additional genetic variability through mutation breeding using chemical mutagens (diethyl sulphate, ethyl methane sulphonate and colchicine). Variety GI-2 was used for the study. Mutants differing in phenotypic



Leaves of DPO 401, DPO 402, DPO 356 and DPO 296

characters were identified from segregating generation of M_2 onwards. These plants were maintained through selfing and repeated selection from the next generation. In M_4 generation some mutants were identified differing in leaf colour. Plants showed variations in leaf colour between golden yellow (DPO 296) to dark green (DPO 401). Intermediates showing yellowish leaf (DPO 356) and light green leaf (DPO 402) were also identified. These characters were found stable under Anand conditions and will be confirmed over different locations. Easily identifiable leaf colour characters can be used as one of the DUS characters for future isabgol varieties.

Interspecific hybridisation in betelvine

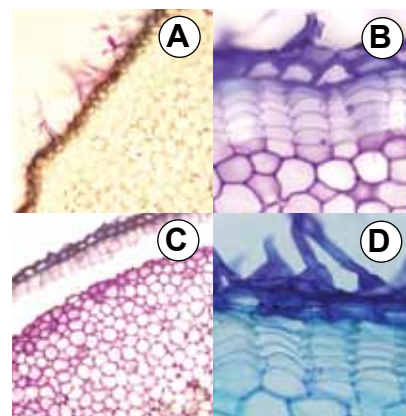
Betelvine (*Piper betle*) is an important cash crop of eastern and southern India. Betel leaves are used for chewing purpose and also as folk medicine. Indian betel leaves are also being exported. The crop generates job opportunities for large number of people. However, it suffers from devastating diseases like *Phytophthora* foot rot, against which no resistance is known. Hence, attempt was made at IHR, Bangalore to use other *Piper* species for hybridisation to incorporate resistance gene(s). Five betelvine lines were used as female parents while *P. hamiltonii* (Awni pan) and *P. colubrinum* (Brazilian thippali) were male parents. Pollen viability in *P. hamiltonii* was 85–92% and it ranged between 90% and 95% in *P. colubrinum*. Though two female lines viz., Halisahar sanchi and SGM1 did not set fruit when pollinated by *P. colubrinum*, line Simarali bhabna local produced nodular fruits. However, these did

not mature and dropped early. On the other hand, two betelvine lines, Simrali bhabna and Bangla nagma recorded 80% fruit set. Nodular fruits of 4.5–6.5 cm length matured in 97–114 days. The fruits contained 17–40 seeds. Such seeds showed 58–70% germination and these hybrid seedlings are now being maintained under polyhouse conditions for further investigation.

Peeling performance of safed musli fleshy roots

Safed musli (*Chlorophytum borivillianum*) is used against general debility. Sapogenin in the fleshy root is responsible for its medicinal properties. The species is grown as a kharif crop and harvested after senescence. Fleshy root is peeled and dried before marketing. Peeling requires lots of investment in labour. However, at DMAPR it was observed that at certain period of crop growth peeling became easy. Hence, systematic work on this aspect was carried out to know the reason of such behaviour. The crop was

harvested between 90 and 240 days after planting (DAP). It was found that peeling was difficult when crop was harvested at early stage (90–120 days). Hence, it was more time consuming. With the increase in crop age, fleshy roots became more amenable to peeling while it again turned difficult after 6 months onwards after planting. Minimum peeling time was taken when harvesting was done between 120–165 DAP. Anatomical investigations showed that during 90 to 105



Cross sectional views of Safed musli fleshy roots at (A) 90, (B) 120, (C) 165 and (D) 180 DAP.

DAP epidermis was single layered with tight adherence with the cortex tissues. This made the peeling of root difficult. After that, development of phelloderm layer was observed. Initially it was 1-2 layers thick which, further increased to 2-3 layers by 120 DAP. This time peeling was possible with less effort. But as the phelloderm increased to 4-7 layers, during the period of 135 to 165 DAP, peeling was very easy. At this time contact between cortex and thin walled epidermal tissues became very loose. Hence, the peeling material consisted of epidermis and layer of periderm. During this period, sometimes removal of periderm was also achieved while washing the fleshy roots. Lignification of epidermal cells was seen in the roots harvested at 165 DAP onwards. This required slightly increased efforts for peeling and peeling time started increasing. In fleshy roots harvested at 180 DAP, cells in the periderm layer became oblique due to internal pressure created by the parenchymatous cells of cortex toward the epidermis layer due to root axis growth. This lead to more attachment of cortex cells with phelloderm layers. Further in 240 days lignifications of epidermis and phelloderm layers were seen. This resulted more difficulty in peeling of roots.

Little leaf of mamejo

Mamejo (*Enicostemma axillaris*) is a perennial herb distributed throughout most part of India to an altitude of about 450 m. The plant is very bitter and is used as an anthelmintic in *Ayurveda*. The shade dried whole plant is also having cooling, tonic, stomachic and laxative properties and is also used in the treatment of diabetes. The bitter principle which is responsible for its therapeutic action includes, glucosides, swertimarine,



Infected and healthy plants of Mamejo

alkaloids, ophelic acid and tannins. The plant is usually collected from the wild. But, based on the demand by the specific industry, its cultivation was initiated at DMAPR. A little leaf disease was observed to affect the crop. The diseased plants were shorter in height and appeared bushy due to more branching. The leaves became small in size, internode length reduced and flowers started turning to vegetative structures. Fresh and dry weights of the affected plants were higher than the normal ones. However, active ingredient in the dried herbage was 20–50% lower due to disease as compared to healthy. Thin cross sections of the leaf and young stem showed yellow fluorescence at the phloem regions when treated with Diene's stain. Symptomatic leaves resulted an amplicon of ~1500 bp size with phytoplasma specific primers in the PCR. Thus, confirming association of phytoplasma with the little leaf disease of mamejo. The affected plants often died after 2–3 months and failed to establish if used as root cutting for propagation purpose.

High fruit producing madhunashini genotypes identified

Madhunashini (*Gymnema sylvestre*) belongs to the family Apocynaceae is used for the treatment of diabetes in various parts of the world. Leaf extracts of this plant has been shown to reduce serum glucose level and improve glucose

tolerance in clinical studies. The heavy demand for this crop in medicinal sector leads to over harvest from its wild source. Hence, systematic cultivation is needed. The plant is usually propagated through seeds and rooted cuttings. Genetic variability of *G. sylvestre* was collected from various agro-climatic regions of India and are being evaluated for morphological and chemotypic variations at DMAPR. Out of 34 accessions tested, 3 accessions viz., DGS 20, DGS 22 and DGS 23 produced profuse fruits (1.5 years old plants) as compared to the



High and normal fruit bearing Madhunashini

other accessions. These accessions were collected from Eastern Ghats (Andhra Pradesh). The number of fruits per plant was 1009, 1259 and 1469 in DGS 20, DGS 22 and DGS 23, respectively with 8-12 seeds per fruit. Since the propagation of *G. sylvestre* through stem cutting is difficult due to poor rooting success, seeds are preferred source of multiplication. These accessions are suitable for multiplication through seeds.

2011

- Will be celebrated as International Year of Chemistry as jointly declared by UNESCO and IUPAC. The theme of IYC 2011 is "Chemistry-Our life, our future".
- Will be celebrated as International Year of Forestry as declared by UN on the theme "Forest for the People".

National Conference on Biodiversity of Medicinal and Aromatic Plants



National conference on "Biodiversity of Medicinal and Aromatic Plants: Collection, Characterization and Utilization" was held during 24-25 November, 2010 at Anand Agricultural University, Anand. The conference was organised by Medicinal and Aromatic Plants Association of India in association with DMAPR, Anand and AAU, Anand. Dr. C. L. Patel, Chairman, Charutar Vidya Mandal, was chief guest of the inaugural session. At the outset, Dr. Satyabrata Maiti, President, MAPAI and Director, DMAPR welcomed the dignitaries and explained the theme of the conference. He

mentioned that, the year 2010 was declared as international year of biodiversity by the UN. To highlight the issues related with the biodiversity of MAP, the conference was organised. Dr. C. L. Patel emphasised the need for proper documentation of the MAP. He also highlighted the utility of traditional medicines in modern era. Dr. A. R. Pathak, guest of honour and Vice Chancellor, Navsari Agricultural University mentioned the use of proper package of practices for harnessing optimum potential of MAP. He also stressed the need of adoption of post-harvest technologies for quality MAP. Dr.

A. M. Sheikh, Vice Chancellor, AAU, Anand, in his presidential address mentioned about the conservation and characterisation need of the traditional MAP. The session ended with the vote of thanks proposed by Dr. V. S. Rana, Secretary, MAPAI and Sr. Scientist, DMAPR. During the two days of deliberations, participants from different parts of the country presented their work in four different technical sessions viz., (i) Biodiversity: distribution and collection; (ii) Biodiversity: characterisation and conservation; (iii) Biodiversity: utilisation and (iv) Biodiversity: policy issues. Two progressive farmers, Sh. Bhaskarbhai Patel and Sh. Mahobat Singh were also felicitated during the conference for their effort towards conservation of MAP. The meeting ended with the plenary session with a demand from the participants to make this conference an annual event for the MAPAI activities.

From the Institute

Institute Management Committee meeting

The 21st IMC meeting was held on 9 August, 2010 at DMAPR under the chairmanship of Dr. S. Maiti, Director, DMAPR. At the outset chairman welcomed all the members – Dr. A. M. Sheikh, Dean, Faculty of Agriculture, AAU, Anand; Dr. K. G. Patel, Dy. Director Horticulture, Gandhinagar; Dr. Guru Raja Rao, J.D., CSSRI(RS), Bharuch; Dr. R. S. Kurothe, Head, CSWRTI(RC), Vasad; Sh. Rajnish Awasthi, Invitee, Sh. Mangal Singh, AFAO, DMAPR and Sh. R. T. Thakar, AAO, DMAPR. He, then presented a brief report of the progress made by the institute. Sh. Thakar presented ATR of the last meeting. Committee members discussed about different agenda items of the meeting and reviewed the various research and developmental activities of the institute.

New Colleagues

Dr. Vandana Joshi, Pr. Scientist (Economic Botany) on 24.7.10
Sh. Raghuraj Singh, Scientist (Farm Machinery and Power) on 27.8.10
Sh. R. P. Meena, Scientist (Plant Pathology) on 16.9.10
Dr. Satyanshu Kumar, Pr. Scientist (Organic Chemistry) on 8.10.10

Transfer

Dr. V. Baskaran, Scientist (Horticulture) transferred on selection to CARI, Port Blair on 31.12.10

Promotion

Sh. S.S. Patelia, promoted to Private Secretary to the Director w.e.f. 9.9.10
Sh. K. Raghunadhan, promoted to AAO w.e.f. 14.9.10
Sh. S.U. Vyas promoted to Sr. Clerk w.e.f. 17.9.10
Smt. R. J. Vasava promoted to

Assistant w.e.f. 26.10.10

Sh. N. J. Ganatra promoted to Assistant w.e.f. 26.10.10

List of distinguished visitors

- Prof. M. C. Varshneya, Former VC, AAU, Anand on 23.7.2010
- Dr. S. Ganeshan, Former Director, TBGRI on 24.7.2010
- Dr. Guru Raja Rao, JD, CSSRI (RS), Bharuch on 9.8.2010
- Dr. A. R. Pathak, VC, Navsari Agricultural University, Navsari on 4.9.2010
- Dr. B. Venkateswarlu, Director, CRIDA, Hyderabad on 22.9.2010
- Ms. Avantika Singh, IAS, District Development Officer, Anand on 24.9.2010
- Dr. C. D. Mayee, Chairman, ASRB, New Delhi on 14.12.2010
- Dr. M. M. Anandaraj, Project Coordinator, AICRP on Spices, IISR, Calicut on 14.12.2010
- Dr. Manjit Singh, Director, Directorate on Mushroom Research, Solan on 14.12.2010

Vallabh Medha- A high yielding cultivar of *Centella asiatica*



A high yielding cultivar of *Centella asiatica* was identified after five years of research at DMAPR and it was dedicated to the nation with the name "Vallabh Medha" (*Vallabh* to respect of Sardar Vallabhbhai Patel in whose birth place DMAPR is located and *Medha* stands for the memory improving efficiency of *C. asiatica*). "Vallabh Medha" is a single plant clonal selection. It is bigger in size in respect to all the morphological characters and leaf area is more than 4.5 times higher than the local cultivar. RAPD markers are also identified for the distinctness of the new variety. Photosynthetic rate is higher while respiration rate is lower in "Vallabh Medha". Fresh herbage and dry herbage yields harvested in "Vallabh Medha" are 12331 and 2113 kg/ha, respectively compared to 2050 and 392 kg/ha in the local variety. Active ingredients are also present in higher quantity in "Vallabh Medha". Scientists involved in the development of "Vallabh Medha" are Dr. Satyabrata Maiti, Dr. Geetha K.A., Dr. O.P. Singh, Dr. N.A. Gajbhiye, Dr. Sanghamitra Samanthuray and Mr. Saravanan Raju. For the planting material please contact:

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Species of Conservation Interest

Piper mullesua Buch. Ham. ex D. Don.
(syn. *P. brachystachyum* Wall. ex. Hook. f.)



The plant belongs to family Piperaceae and is commonly known as 'cab', or 'cavyah' or 'Pahari peepal'. It is a climbing glabrous shrub distributed in the higher altitudes up to a height of 1500 m in the subtropical Himalayas, from Shimla to Nepal, Bhutan, Khasi hills and Nilgiris in the evergreen to shola forests. In India, the species is found in Himachal Pradesh, Uttar Pradesh, Bihar, West Bengal, Sikkim, Meghalaya, Karnataka, Kerala and Tamil Nadu. The plant is highly branched with rooting nodes. Lower branches have small sized leaves comparing to the upper branches. Male and female flowers are arranged in separate spikes. Flowers are minute, greenish yellow. Female spikes are erect, globose ovoid of about 2x 1 cm. Berries are ovoid, smooth with green

at young stage and become red when ripe. Male spikes are 3-6 cm long, erect, slender and cylindrical. The plant flowers during April to July and fruiting occurs during August to October. The leaves on steam distillation produce a volatile oil with an odour of lime oil. Roots and fruits are used in Ayurvedic system of medicine for the treatment of acute bronchitis and related disorders of respiratory tract. The plant is propagated by stem cuttings. The study conducted by Foundation for Revitalization of Local Health Traditions (FRLHT), Bangalore showed that the species status is 'vulnerable' in Karnataka and Tamil Nadu and at 'lower risk near threatened' in Kerala.

Earth is here so kind, that just tickle her with a hoe and she laughs with a harvest.

– Douglas Jerrold

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