



NEWSLETTER

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Our New DG



Dr. S. Ayyappan has joined as Director General, ICAR and Secretary, DARE on 1 January, 2010. He was born at Alakere in the state of Karnataka, India on 10 December, 1955. His specific areas of research are fisheries, freshwater aquaculture and aquatic microbiology.

Prior to his present assignment he has served at different levels in the ICAR system – as the DDG (Fisheries); Director, CIFE, Mumbai; Director, CIFA, Bhubaneswar and Scientist – Principal Scientist.

He has made significant contributions to administration

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Training Programme on Aromatic Crop Cultivation and Value Addition Held



A training programme for the farmers of Gujarat state on cultivation of aromatic crops and value addition technologies was held on 30 November, 2009 at DMAPR in collaboration with Krishi Vigyan Kendra (KVK), Mehsana. The programme was sponsored by the Central Sector Scheme. Training was imparted to 55 farmers and cultivators of Mehsana district and a few from other districts of Gujarat on the cultivation of aromatic crops and their value addition techniques. The chief guest of the inaugural function, Dr. S. N. Tyagi, IFS, Member Secretary, State Medicinal Plants Board, Gujarat addressed the farmers and encouraged the farmers to take up cultivation of the aromatic crops and explained in details the efforts undertaken by State Medicinal Plants Board and other government agencies for promotion and support

available for the cultivators of medicinal and aromatic crops. Dr. Satyabrata Maiti, Director, DMAPR briefed the activities of DMAPR in research and development. He also presented the facilities available for analytical needs of all the stake holders. He specifically highlighted the importance of Good Agricultural Practices and invited the farmers to form SHG for keeping records of their farm activities for getting the GAP certification.

The technical session comprised of presentations by resource persons which was followed by on-farm demonstration of different activities and visit to analytical laboratories. Dr. K. Mandal, Dr. V. Chaudhary, Sri. S. Raju (all from DMAPR) and Dr. Manish Patel (KVK, Mehsana) talked on various aspects related

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EDITORIAL

Health is Wealth

Everywhere you walk in nature, you are surrounded by medicinal plants growing uncared. Some plants among them are great edible, supply nutrients as well as strengthen our different VITAL systems to protect from various ailments. Some of the medicinal species are also having mosquito and other insect repellents activity. It is truly astonishing that how many useful medicinal plants are pulled out or poisoned or destroyed in our gardens everyday throughout the world. If a little care is taken, so many of those could go to better use. The year going to begin tomorrow has been declared by United Nations as International year of Bio-diversity. There will be lot of celebrations and awareness meetings and discussions worldwide to remind once again that we are an integral part of nature; our fate is tightly linked with biodiversity, the huge variety of other animals and plants, the places we live and our surrounding environments, all over the world.

We inescapably depend on this diversity for our food, fuel, medicine and other essentials and simply cannot think of living without it. Yet this rich diversity is being lost at a greatly accelerated rate because of more and more human activities in the name of growth, full of greed. If this rate continues, we all will be ruined sooner or little later and the signal of such growing threat is the climate change. People all over the world are working to safeguard this irreplaceable natural wealth and reduce biodiversity loss. This is absolutely important for current and future human wellbeing. We need to do more. Now is the time to act.

I find urban Indian landscape is changing first and also urbanization in small town and its adjoining village areas is spreading at faster pace. A new ruthless group has emerged named "Developer" who are actively encroaching the cultivated land in the plea of developing housing complexes. Law exists: that conversion of agricultural land for non agricultural use requires approval from the authority. But such approvals are very liberally given. Net result is huge biodiversity loss. We should have now a strict national plan of urban expansion and target of having green area surrounding the city or town in proportion to the requirement of human for their well being.

A humble beginning must be initiated in the International year of biodiversity to grow at least two trees in the backyard of every household and it should be linked with the approval of house planning by the town or city planning division.

Following comprehensive re-vegetation and vegetation protection programs can be made mandatory under these circumstances:

- Tree Scheme - Providing native seedlings for re-vegetation to landholders at low cost.
- Seed Collection - for re-vegetation
- Tree For Life - Training for community volunteers and landholders annually
- Direct Seeding - Broadscale revegetation of cleared land across the state
- Carbon Neutral – Biodiversity plantings for carbon offsets

Regeneration and vegetation programme linking with Medicinal plant gardening is a wonderful way to begin incorporating permaculture into our life. Growing useful medicinal plants allows us to experiment with small-scale sustainable gardening methods while helping us to learn how to create our own home remedies. We can grow herbs to use towards treating basic ailments (primary health care) to maintain our family's health while cutting ever-growing health care costs. It is also easy to successfully practice medicinal plant gardening whether you have a large front or back yard or just a couple of large pots to work with. A careful selection of plant species would take care of most of our common diseases.

I therefore, call upon all the citizens of India to ponder upon the issues flagged by me in the above paras and let us act upon these to realize the slogan "health is wealth" without losing further time.

Jai Hind!

Satyabrata Maiti

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to trade, cultivation of aromatic crops and value addition of essential oil. After the technical session, farmers were briefed about the analysis of essential oils and facilities available at the institute for testing. A practical demonstration on extraction of essential oil in the pilot plant was also arranged for educating the farmers on all the aspects of essential oil extraction and downstream processing. The programme ended with concluding remarks and feedbacks from farmers.

Breakthrough & Research Highlights

In vitro propagation of jyotishmati

Jyotishmati (*Celastrus paniculatus*) is an important medicinal plant. Its seeds are medicinally important for its emetic, diuretic and nervine properties and are used for the improvement of memory. It is also used for the treatment of sores, ulcers, rheumatism and gout. Besides, the seeds contain oil which is used to treat the scabies, rheumatic pains, eczema and paralysis. The oil is also having the tranquilising effect and used to treat mental depression and hysteria. Large-scale collections from the natural habitat coupled with poor seed germination made this plant vulnerable in Kerala and at lower risk to near threatened in Karnataka and Tamilnadu. Therefore, a micropropagation



method has been developed at DMAPR for its large scale multiplication.

In vitro morphogenesis via organogenesis was achieved on callus cultures derived from immature zygotic embryos (35 days after flowering) in half-strength MS medium supplemented with BAP, 2-ip, zeatin and IAA. The medium containing BA (0.1-0.5 mg/1),

NAA (2.0-3.0 mg/1) and Dicamba (0.5-1.0 mg/1) produced best callus growth after 4 weeks of incubation. Subsequently, the calli differentiated into green nodular structures which developed into dark green shoot buds in the 1/2 MS media supplemented with BAP (0.1-0.5 mg/1), zeatin (1.0-2.0 mg/1) and IAA (0.01-0.1 mg/1) grown under 16-h photoperiod. Rooting was achieved on medium containing 0.10-0.25 mg/1 IAA/IBA. The study is the first report of the micro-propagation success in this species which may open the new avenues for mass multiplication of this species. Moreover, the present procedure would provide an effective strategy for the conservation and building up of nuclear base populations of this widely exploited species.

A new procumbent plant type in ashwagandha



Ashwagandha (*Withania somnifera*) is an important herb in the ayurvedic and indigenous systems of medicines. Over the past 3000 years the plant has been used as an antioxidant, adaptogen, aphrodisiac, liver tonic, anti-inflammatory, astringent and more recently to treat ulcers, bacterial infections, venom toxins and senile dementia. It is commercially cultivated in the western Madhya Pradesh as late kharif crop. Increased demand has resulted its cultivation in non-traditional areas as well.

Two high yielding varieties have been released. However, distinct phenotypic markers are not spectacular. Hence, identification of stable phenotypic markers and their fixing to develop varieties have been targeted.

It is an erect branching shrub belonging to family solanaceae. The cultivated ashwagandha plants attain 30–60 cm height while natural population is found to reach 90–120 cm height. A procumbent (spreading) plant type with 25–30 cm height is identified at DMAPR, Anand. It has 5–7 primary branches and 7-9 secondary branches. Both primary and secondary branches grow horizontally on the soil like trailing plants. Main stem also bent down at 15-20 cm height. The plant has a canopy diameter of 40-45 cm with normal flower and fruit setting.

The plant was isolated from 150 single open-pollinated plants of cultivar JA134 during 2007.

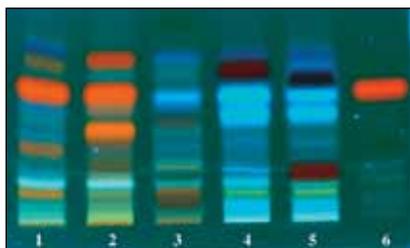
Subsequently, it was purified by selfing and grown in progeny rows. The stabilised procumbent plant type (DWS 6) is being maintained at DMAPR. Such plant type would be useful as distinct plant type in DUS descriptor.

Reproductive behaviour of Asoka

Asoka (*Saraca asoca*) is a medicinal tree whose bark is used for several ayurvedic preparations. Variability between the accessions collected from different locations have been observed. However, transferring the beneficial traits needs pre-breeding studies like reproductive behaviour of the species. At Trichur, flowering, pod- and seed-setting were noted over the year to identify best time for breeding work. Trees produced the maximum number of inflorescence during February while minimum in September. The number of flowers per

inflorescence followed a similar trend producing more flowers in February and March while least flowers in the month of September and October. Maximum pods per tree were observed in May followed by June. Seeds per pod recorded maximum number in March and April. Duration of bud to pod required 132 days in September while 136 days in December. Higher temperature had a positive correlation with number of inflorescence per tree, flower per inflorescence and pods per plant. Flower length and breadth, pod length and seed size showed a positive association with sunshine hours. Rainfall and relative humidity showed a negative influence in flower length, its breadth, pod length and seed size. Relative humidity had a negative influence on number of pods per tree.

Chemical fingerprint of Aloe species



1 = *A. vera*, 2 = *A. perryi*,
3 = *A. chinensis*, 4 = *A. rupestris*,
5 = *A. ciliaris*, 6 = Aloin

Aloe is the source for two important commodities – gel and aloin. Aloe gel is used for cosmetic purposes while aloin has medicinal applications. Among over 300 different Aloe species, two (*A. vera* and *A. ferox*) are commercially utilised for aloin extraction. Hence, HPTLC fingerprinting of exudates from five species – *A. vera*, *A. perryi*, *A. chinensis*, *A. rupestris* and *A. ciliaris* was done at DMAPR to identify if aloin was present in these. Three different solvent systems containing ethyl acetate, methanol, formic acid, chloroform, water

in different combinations and proportions were tried to develop best resolved fingerprints. Among these, a mixture of chloroform, methanol and water (6.5:2.5:0.2) was selected for best separation of the chemical constituents. There were 6 bands in *A. vera*, 8 bands in *A. perryi*, 9 bands in *A. chinensis*, 7 bands in *A. rupestris* and 8 bands in *A. ciliaris*. However, aloin-A specific band was observed in *A. vera* and *A. perryi* only. Even, its concentration was also lower in *A. perryi* compared to *A. vera*.

Performance of brahmi under shades

Brahmi (*Centella asiatica*) is valued for its memory enhancing power. Under natural population it is found to grow as under shrub at moist and humid areas. Hence, at DMAPR, performance of the elite genotype (INGR 08105) was compared with respect to Anand local under different shade levels. The genotypes were grown at 75%, 50%, 25% of shades and under open conditions. The elite line was superior in terms of herbage and asiaticoside yields, irrespective of the shade levels. Plant height, runner length, leaf area, pedicel length and pedicel diameter significantly increased in higher shade levels. However more leaves were produced in the open conditions. Fresh herbage yield was not significantly influenced by the different shade levels. However, dry matter content was more in decreasing shade levels and it was highest in the open conditions in both the genotypes. Consequently, dry herbage yield was also higher in the open conditions. Genotypic difference was observed in the case of asiaticoside content under different shade levels. Asiaticoside content showed decreasing trend in increased shade level in the case of the elite genotype, however, in the local type, the

trend was in the reverse order and it was highest in 75% shade level. However, asiaticoside yield was more in the open condition in both the genotypes which was due to the higher herbage yield in the open condition.

Variation in essential oil content of sweet worm wood

'Sweet worm wood' or 'Qinghao' (*Artemisia annua*) belonging to the family Asteraceae is an aromatic herb with high potential value of essential oil and artemisinin, an antimalarial compound. The essential oil of this plant has wide usages in perfumery, cosmetics and aromatherapy. The oil content is reported to range from 0.02–0.49% (fresh weight basis). Looking into the market demand of essential oil, feasibility study of its production in Gujarat conditions was initiated at DMAPR. The crop was sown in December on the raised nursery bed and the seedlings were transplanted in the main field in February. Crop was harvested at four phenological stages viz. vegetative (May, 2009), pre-bloom (September, 2009), full Bloom (October, 2009) and post-bloom (November, 2009). Essential oil was extracted by hydro distillation. It was observed that oil content was highest during full bloom (0.76%) followed by post bloom (0.59%). However, herbage contained less than half oil during other two stages – 0.28% during pre-bloom and 0.24% at vegetative phase.

First issue of Open Access Journal of Medicinal and Aromatic Plants is published. Access it free at www.ojs.oksociety.in/index.php/oajmap/issue/current.

Obituary



Plant Pathology from University of Minnesota. He was conferred PhD

**N o r m a n
E a r n e s t**
Borlaug was born in a farm near Cresco, Iowa in 1914. He received BS degree in Forestry and MS under

in 1942. In 1944 Dr. Borlaug joined a Rockefeller Foundation programme for co-operative wheat production in Mexico. He initiated breeding after 'personally talking to each plant'. His 'shuttle breeding' programme resulted high yielding, short duration, disease resistant wheat. During 1963 Dr. Borlaug visited India, saw the fields and provided a range of breeding materials. The seed of Green Revolution was sown which ultimately converted India from a 'country with begging bowl' to self sufficient

in food grain production. Similar model was replicated in other parts of the globe too. Borlaug's applied scientific work bestowed him Nobel Peace Prize in 1970. He was also a recipient of the India's second highest civilian honour, Padma Vibhushan in 2000. "Father of Green revolution" Norman Borlaug, died of cancer on 12 September 2009. May his soul rest in eternal peace while his caution "don't relax, pathogen does not sleep" be our guiding force to make his dream "free the world of hunger" true.

From the Institute

Institute Management Committee meeting

The 20th IMC meeting was held on 30 December, 2009 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. D. V. Bharot, Dy. Director Horticulture, Gandhinagar; Dr. Guru Raja Rao, J.D., CSSRI(RS), Bharuch; Dr. R. S. Kurothe, Head, CSWRTI(RC), Vasad; Dr. Vipin Chaudhary, Sr. Scientist, DMAPR; 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. The meeting ended with the vote of thanks to the Chair.

Annual Day celebrated

On 24 November, 2009 the institute observed Annual Day coinciding with its foundation day. Members of the DMAPR family consisting of staff from all categories took part in a function arranged to commemorate the occasion. The function was also attended by the members from other ICAR institutes from Baroda, Godhra, Vasad and AAU, Anand. Dr. Satyabrata Maiti, Director of the institute presided over the function. He narrated the progress made by the institute in recent years even with its minimum manpower. Sh. R.N. Joshi, Collector and District Magistrate of Anand graced the occasion as chief guest. He congratulated all the staff members and wished

that the institute would grow further to meet the expectations of the mass.

Distinguished Visitors

- Prof. P. Das, Former ICAR National Professor on 20.7.2009
- Dr. K. A. Singh, Director, IGFRI, Jhansi on 3.8.2009
- Sh. Ananth Kumar, Ex. Cabinet Minister, Government of India on 10.8.2009
- Sh. A.M. Diwakar, Chairman, AIIMS Engineering College, Bangalore on 10.8.2009
- Dr. S. N. Tyagi, Member Secretary, SMPB, Gandhinagar on 5.9.2009
- Sh. R. N. Joshi, IAS, Collector and District Magistrate, Anand on 24.11.2009
- Dr. A. K. Srivastava, Director, NDRI, Karnal on 11.12.2009

Human Resource Development

Name	Details	Date
Dr. M. V. Kawale, RA	Hands on training on standardized protocols of pharmacognostic study for the characterization of medicinal plants at NBRI, Lucknow.	29 August – 4 September, 2009
Dr. P. Manivel, Principal Scientist (Plant Breeding)	Data mining and GIS for decision support in agriculture at Indian Institute of Management, Lucknow	31 August – 11 September, 2009
N. S. Rao, Scientist (SS) Computer Application	Decision making in agriculture using data mining at NCAP, New Delhi on	27 October – 16 November, 2009

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and research management of the National Agricultural Research System since 1996. Under his leadership CIFA received the 'Best ICAR Institution Award, 1996. He was Founder Chief Executive, National Fisheries Development Board, Hyderabad and virtually established the Board.

Dr Ayyappan has represented the country in several important international fora. He has served on the Boards of several international institutions/organisations such as Network of Aquaculture Centres in Asia-Pacific (NACA), Bangkok, Thailand; World Fish Centre, Penang, Malaysia.

Dr Ayyappan has over 200 publications in reputed journals, proceedings and books. He also has two patents and one design in his name. He has received number of prestigious awards and honours such as Zahoor Qasim Gold Medal, ICAR Award for Team Research and V. G. Jhingran Gold Medal. He is a Fellow and Vice-President of National Academy of Agricultural Sciences, India; Asian Fisheries Society, Manila, Philippines and Vice President, Indian Society of Coastal Agricultural Research.

In his first communication to the members of ICAR after joining as DG, he has weighed the present agriculture scenario as grave and aptly suggested for "knowledge-based enterprise to achieve the goal of farmers' well being.... with a 'Team Approach' based on interactive and consultative efforts." We the members of DMAPR congratulate him for his present achievement and pledge to fulfil his expectations.

Species of Conservation Interest

Trichopus zeylanicus Gaertn.

Trichopus zeylanicus belongs to the family Trichopodaceae (Dioscoreaceae) and is commonly known as Aarogyapachha (means "the green that gives strength"). It is endemic to Sri Lanka, southern India and Malaysia. In India it is found as undergrowth at an altitude of around 1,000 meters of Southern Western Ghats of Kerala and Tamil Nadu. The species is found in shady moist areas and slopes of semi-evergreen to evergreen forests. The sub-species found in India is *T. zeylanicus* Gaertn. subsp. *travancoricus* (Bedd.) Burkill. However it is yet to be confirmed, whether the sub-species occurring in Sri Lanka and the Malay peninsula have the same medicinal properties as *T. zeylanicus* var. *travancoricus*.

T. zeylanicus subsp. *travancoricus* is a perennial herb with a number of stems originate from the under ground rhizome which is 4-12 cm long, purplish brown in colour and bear single leaf in each stem. Rhizome is short and stout of about 2 cm long. Leaves are simple; lamina is leathery in appearance, dark green colored and occasionally with purplish shade. Flowers are bisexual, clustered at the base of the leaves on slender stalks. Fruit is 3-angled and indehiscent type. Flowering and fruiting occur during November to March. The plant is propagated by rhizomes and seeds.

Fruits and leaves are medicinally important. It possesses anti-

fatigue properties and also has potent anti-stress, energy boosting and immuno-modulating properties. The plant is used as a source of strength and energy by the 'Kani' tribes of Kerala. Chemical and pharmacological investigations showed that the plant contains flavonoid glycosides, glycolipids and some other non-steroidal compounds with profound adaptogenic and immuno-enhancing properties. The scientists of Tropical Botanical Gardens Research Institute (TBGRI), Trivandrum, were successful in developing a scientifically validated and standardized herbal drug, 'Jeevani' based on the tribal knowledge. It has been patented by TBGRI in India with an arrangement that 50% of commercial return shall be shared with the tribal community.

Study conducted by the Foundation for Revitalization of Local Health Traditions, Bangalore showed that the species is endangered globally due to over exploitation and conservation activities are to be addressed urgently.



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