EVERGREEN

SILVER JUBILEE YEAR kfri 1999 - 2000

Half Yearly Newsletter of The Kerala Forest Research Institute

No. 44 March 2000

KFRI - gearing up for 21st century

This issue of EVERGREEN is particularly significant for several reasons: Firstly, it brings you the new millennium greetings from KFRI for global care! Secondly, it comes to you on a special occasion of the Silver Jubilee year of KFRI coinciding with the beginning of a new era. Thirdly, it extends invitation to all readers to participate in the international symposium on "Tropical Forestry Research: Challenges in the New Millennium" to be held at KFRI Peechi during 2-4 August 2000 in commemoration of the silver jubilee year to gear up for new challenges of the 21st century.

While addressing the XI World Forestry Congress in Turkey, the President of IUFRO - Prof. Jeff Burley concludes, "among the most critical global factors in the new millennium will be water supplies, food security and human poverty in the face of increasing populations and climate change". Naturally, at this point of time, questions that arise are many - how forestry sector is linked to these burning issues in the context of sustainable development? While forestry is typically a long-term enterprise and forestry research requires sustained efforts for fruitful results, what are the milestones of KFRI over the past 25 years in moving towards sustainable forest management (SFM) at the helms of deforestation, biodiversity conservation and climatic impacts? Where do we go now at this juncture of "zero-year" (also the Silver Jubilee Year of KFRI) to get poised for a major breakthrough in tropical forestry?

India is one of the world's 12 mega-biodiversity countries. The National Forestry Action Programme (NFAP-1998) aims to enhance the contribution of forestry and tree resources to ecological stability and people-centred development through qualitative and quantitative improvement in investment on sustainable conservation and development of forest resources. The main programme areas include:

- forest protection, soil and water conservation, protected areas and biodiversity conservation
- improving forest productivity by rehabilitation of degraded forests, assisting private initiatives, improving planting stock using biotechnology, research and technology development for new/value added products, development of non-wood forest products (NWFPs)
- reduction of total demand for fuel-wood, timber, NWFPs
- strengthen policy and institutional framework including central and state forestry administration and institutions
- Expansion of forest area, including forest plantations and promotion of people's participation in forestry.

Tree - The Caretaker of the planet

With a message from Dr. J. K. Sharma, Director of KFRI and an article on the relevant theme, by Dr. C. Chandrasekharan, the founder Director of KFRI, this issue will give an insight into the vision and new directions of research and technology to face the challenges of new millennium. Let us hope, the frontier areas such as biotechnology and information technology will compliment rather than mere competing with the tropical forest science and technology!

K. M. Bhat
Editor

From the Director's Desk

KFRI's Silver Jubilee - Year of reckoning

Kerala Forest Research Institute is celebrating the 25th year of its establishment. We owe a great deal to the vision and farsightedness of late Sri C. Achutha Menon former Chief Minister who conceived the idea of establishing such R & D institutions, which cater to the specific needs of Kerala State. The dream was conceptualized and made a reality by the former Directors Dr. C. Chandrasekharan and Dr. P. M. Ganapathy whose contributions to giving shape to the Institute and "our own culture" cannot be undermined. Whatever we are today, it is because of their untiring and relentless efforts to make KFRI a centre of excellence in tropical forestry research.

Although 25 years' time in the history of an institute is not long but it is long enough to prove its credibility in delivering the goods for which it was established. It is satisfying that KFRI has made a niche among the tropical forest research institutions because of time-bound quality research in various areas of forestry, ably supported by the technical and administrative staff of the Institute. This is evident from the fact that quite a few scientists are invited by international organizations like FAO, DFID, and FORSPA to solve forestry-related problems in other countries. Our scientists have been nominated as office bearers of various prestigious committees/ Working Parties of international bodies such as IUFRO and IPGRI. Recently, one of our scientists, Dr. KM Bhat has also been selected for the IUFRO Scientific Achievement Award, to be presented during the XXI IUFRO World Congress.

We don't have to be complacent with our achievements! Now is the time for all of us to sit back and take stock of our research activities in terms of their relevance and quality and decide future course of direction in research in the new millennium. We have to be innovative and be aware of latest developments taking place in various fields of forestry, biotechnology and molecular biology so that worthwhile high standard research of practical relevance can be undertaken not only to fulfil the needs of Kerala Forest Department (KFD), but other neighbouring states as well. In this context, now a High Level Committee is reviewing the R & D activities of the Institute with a view (1) to review KFRI's R & D activities in *toto*, (2) to set research priorities and (3) to make recommendations for sharpening the focus of research with appropriate futuristic perspective.

KFRI conducts multidisciplinary, basic as well as applied research of practical relevance and during the past two decades we have generated a strong database in various forestry sectors. Although, quite a few of our research outputs have direct field application and could have been implemented by the KFD, but the extent of transfer of technology from lab to land in terms of implementation has not been to our expectations. Possibly, this could be due to the absence of a mechanism in KFRI, which could have helped in this direction. Establishing a new Division of Extension, approved by Governing Body, is likely to remove the lacunae and play a major role in transferring the technology to KFD.

And lastly, the funding - which is the backbone for the growth of any institution. Though KFRI generates sufficient funds from State, National and International agencies for sponsored research, the grants received from the State Government are not sufficient to meet even the salaries of staff resulting in huge deficits over the years. This has affected further progress of the Institute in terms of infrastructure development and fresh deployment of human resource. Our concerted efforts to obtain additional funds are now paying dividends and, hopefully, in the near future we will be able to bridge this gap of deficit. As we move forward to a more self-reliant future, we seek to strengthen our resource base to ensure that we maintain our position at the forefront of tropical forestry research.

J. K. Sharma

Contents

Sustainable Development - a New Challenge to KFRI

C. Chandrasekharan*

The wealth and poverty of nations (and communities) are often a function, among others, of the state and relevance of technology and the availability of technologically competent human resource. The theme of the World Development Report for 1998-1999 released by the World Bank is *Knowledge for Development*. It indicates that research is vital in generating relevant knowledge, and is one of the most powerful tools for achieving sustainable development. Whether this tool has been properly and adequately used is a moot point, in many situations. Forestry in India, probably represents such a situation.

Historically, when forests were comparatively abundant and population (and demand on forests to satisfy their needs) comparatively low, there was not much disturbance to the ecological balance. Also, for a long period in the past, forests were often considered by many as a land bank (stock of wild lands to be converted into other forms of land-use). There was no pressure for innovations or to develop forestry as a major scientific discipline. There, of course, existed the normal urge to expand the horizon of knowledge and the need to satisfy curiosity. The early investigations relating to forestry, therefore, were mostly centred on gaining general understanding about the gross nature and uses of forests and their capacity to satisfy direct human needs.

Forestry in Crisis?

The situation has changed considerably over the years. Land being a finite resource there have been pressing needs to convert forest lands into other forms of uses. Development of trade and marketing and facilities for transportation of goods increased the demand for forest products of both wood and non-wood origin. Population increase, urbanisation and economic/income growth have also brought in new demands and consumption pattern, spurred by development of mass markets. Land transfers, non-integrated nature of land use policies and practices, as well as uncontrolled and unsustainable use of forest resource resulted in accelerated deforestation, resource wastage and forest degradation. These reduced the area under forest cover, during the last 50 to 70 years, on a scale much larger than ever before.

The real and emerging scarcity of resources also lead to new developments. With the state-owned forest lands becoming unable to meet the needs (direct and indirect) of the people, other (additional) sources such as

village/community wood lots, home gardens and farm trees are playing a major and increasingly important role. Apart from the natural plant association predominantly of trees and other woody vegetation, the scope of forestry has widened to include tree (block and line) plantations, groups of scattered trees, agro-forestry plots, small wood lots, urban tree planting and also wild lands which do not support tree population. Forestry has evolved from tree management to the management of complex ecosystems covering both flora and fauna and their sustainable utilisation. Forestry, today, has a wide spectrum of interfaces and multi-dimensional array of impacts. The situation calls for new and in-depth knowledge about forest resources, their use and non-use values, externalities, their management and conservation, and interlinkages of forestry with other sectors. With the state-owned forest lands becoming unable to meet the needs (direct and indirect) of the people, other (additional) sources such as village/community wood lots, home gardens and farm trees are playing a major and increasingly important role

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Continuous change is considered as an absolute condition of development. But the change has to be positive, for the better. It is often difficult to assess the magnitude and direction of change in advance because of biases, conflicts of interests and lack of objective criteria. Also, waste, pollution and irremediable environmental damage often accompany economic development.

The situation of forestry has reached a critical stage that the world concern and a sense of urgency have been repeatedly expressed during the last 30 years in declarations, conventions, protocols and principles (more loudly and clearly than ever before at the 1992 Earth Summit); but still without much perceivable effect.

Sustainable Development and Forestry

Most of the forest resource depletion in the recent past took place in the name of development. Sustainability, sustainable development, and sustainable forest management has now become cliches. The emphasis on sustainability resulted from recent experience of the planners that development, which does not conserve the environment, will not be sustainable. From a national policy point of view, sustainability, is not an option but imperative

* *The author, an eminent forester from the Indian Forest Service and recently retired from FAO as Senior Forestry Officer, is the founder Director of KFRI*

Meaningful improvement of human welfare is the essence of development. In this context, a World Bank paper states that a primary goal of sustainable development is to achieve a reasonable and equitably distributed level of economic well-being that can be perpetuated continually for many human generations. It requires that allocation of resources to meet the needs of the present generation should not prejudice the interest of future generations. Without sustainability, environmental deterioration and economic decline will be feeding on each other leading to social decay and political upheaval. The linkage between sustainable development and environmental conservation has been articulated in various international fora. Development has physical, environmental, economic, social, cultural and other processes. Physical developments, that are poorly conceived, planned and implemented, are the causes of many of today's severe environmental problems affecting soil, water, flora and fauna, biodiversity and integrity of ecosystems vital for human welfare and security.

Sustainable management of renewable natural resources should inherently be based on using resource increments (representing interest earned), and not consuming capital. The rate of harvest of living resources should not exceed rates of regeneration.

Equity and efficiency are aspects highly relevant and closely related to the concept of sustainability

People's participation signifies active involvement of people in the decision making process in so far as it affects them. Non-participatory approaches (and goals) may tend to be exploitative and, therefore, unstable.

Participatory approaches require sharing of efforts, responsibility and benefits. Forestry should be able to facilitate and benefit from people's participation in all facets and aspects of forestry.

Efficiency is linked to productivity and co-ordinated development for increasing overall benefits and reducing overall costs - direct and indirect, economic and environmental. As a renewable resource, essential for meeting human needs, an important function of forests is production of goods and services. Efficiency in production implies improving productivity (increasing output per unit of input), reducing wastes and indirect costs (negative externalities) and thus registering higher economic rate of return in comparison with other alternatives.

Research and technology for sustainable development

Enhanced research and technology inputs are crucial for continuous and sustainable development of forests, for expanding the horizon of knowledge and for solving problems. The Forest Principles (UNCED 1992) have specially highlighted the need for enhanced scientific research for sustainable management of wood and non-wood resources. Scientific and technological breakthrough will help to keep up the vibrancy of sectoral development.

Research and technology are the two sides of the same coin. They grow by one feeding the other. Research results need to be translated into practical technology for promoting development, and research gets linked to products and markets through technology. Advancement of a society and economic growth of a country are dependent on their technological development. Research is the foundation of technological development, without which sectoral development is unattainable.

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In a broad sense, forestry research involves all types of investigations relating to the basic understanding of the nature and functioning of forests, the role of trees and non-tree resources, and how that role can be made more effective for improving human welfare. As such forestry research includes the wider spectrum of economic research, sociological research, policy research, as well as the traditional biological, ecological and physical science research covering the core and interface areas.

Various terms are used in defining the scope for research. For example, basic research is done to understand the basic processes and to provide the basic knowledge that can be used in a wide variety of applied research. Basic research opens up the frontiers of knowledge. Applied research is done to solve specific problems and to provide knowledge and technologies that can be used for sectoral development. Adaptive research involves taking applied research results from one location and adapting them to another location Strategic research is aimed at defining research strategies and priority areas in which specific applied research projects should focus.

It is necessary to emphasise here that an effective research plan for forestry should keep an appropriate and healthy balance in its scope and nature with the ultimate objective of ensuring sustainable benefits to the people. Responsibility for the different types and areas of research can be shared (say, among research centres, universities and other relevant institutions), to avoid unnecessary duplication and for effective use of scarce resources.

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Deficiencies in Forestry Research

Forestry research in many countries has produced many important benefits (such as domestication of species, genetically improved varieties of plants, productivity grains, new products and uses and new agroforestry combinations), while reducing related costs. Research in the natural tropical forests of the world has also resulted in the identification of a number of important sources of medicines, sustainable use of tropical forests and conservation of gene pool needed to evolve high yielding varieties of food and forest crops which the world may need for future survival of mankind. The end result, often, is that the impact of research is not seen reflected in improved forest management or enhanced productivity. In India, for example, several areas relevant to sustainable forest management have only received scant or inadequate attention from the point of view of research and technology development. These, among others, include: assessment and valuation of resources, management of natural forests/ecosystems; management of forests for non-consumptive uses such as bio-diversity conservation, recreation, eco-tourism and other environmental benefits and services; integrated management of wood and non-wood resources; sustainable (and non-destructive) harvesting/utilisation of non-wood forest products; block and line planting of fast growing and high yielding species; biotechnology; waste reduction and waste utilisation; forest fire management; forest grazing and fodder resource management; chemistry of forest plants (for pesticides, medicines, agro-chemicals, flavours, fragrances, colourants, food additives); drugs from bugs/insects; buffer zone management; enhancement of agro-forestry systems and combinations; trees in farming systems; rehabilitation of waste lands; process development for value addition; work safety; trade and market development; impact analyses; policy and institutional analysis; improvement of organisation and methods; application of GIS; and validation and enhancement of traditional knowledge/practices. Research relating to the large and heterogeneous group of non-wood forest products is extremely complex; but, research initiatives on them are yet to pass the stage of hesitation and stray trials. Similarly, hardly anything has been done to harness the market for environmental services (carbon sequestration, recreation, and sustainable wilderness tourism). The research needs in the forestry sector would call for multidisciplinary approach, involving diverse skills: agronomy, anthropology, biology, ecology, entomology, ergonomics, farming systems, food security; fiber technology, information system/technology; mycology, nutrition, rural sociology and other disciplines. These have not hitherto been incorporated in any meaningful manner.

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Deficiencies in forestry research are several. The present situation of the forestry sector in India is a reflection of the lack of significant contributions or major breakthroughs made by the forest research institutions. Research is a neglected area of forest sector development. Gaps in forestry research and technological innovations is clear from the low level of forest (and forest plantation) productivity; high level of wastage in forest harvesting, processing and utilisation; inadequate knowledge about the potential of NWFP's and inadequate work on agroforestry combinations and requirements.

In this regard there are several problems/constraints to be addressed. There is a lack of adequate awareness on the part of decision-makers, at the political and bureaucratic level, about the importance of sustainable forestry development in general and of forestry research in particular. Consequently, forestry research receives low priority as reflected in the lack of adequate funds, facilities, trained manpower and research skills, long-term research plans and appropriate extension facilities, leaving tremendous technological gaps in several vital aspects of forest management.

For example, forest fires influenced by climate variability and rapid demographic changes have become a major problem in several parts of the country adversely affecting the sustainable management of forests.

Still no serious research efforts have been initiated relating to integrated forest fire management covering analysis of weather data and weather variability, identification of hot spots and early warning, fire prediction and surveillance, fire prevention and control, fire monitoring, fire suppression, mitigation of haze pollution, forest fire classification and post fire rehabilitation.

Also, the funds for research (and technology development) being far from sufficient, it is too thinly spread over items, topics and organisations. Lack of research facilities (equipment, materials, and infrastructure), inadequate human resources (in terms of quantity and quality) and lack of adequate arrangements for extension/dissemination of research results in the form of technological packages are the direct consequences of inadequate priority and funding for research. Other related aspects compounding the problems/constraints are bureaucratisation of research institutions and lack of requisite autonomy. These often serve as a disincentive for committed and result-oriented research. People's/client's participation is also not seriously sought after for their vital contributions relating to problem identification, on-farm trials, dissemination of information and assessment of the success of research in the 'market' place (in terms of its applicability and impact).

Towards The New Millenium

Even at the risk of repetition, it is to be emphasised that research and technology development on all aspects of forestry (scientific, technological, economic, social, environmental and institutional) are an essential need to keep the dynamism of the sector and to support sustainable development.

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tial need to keep the dynamism of the sector and to support sustainable development. It is necessary to considerably enhance/ strengthen the forestry research capability in India. Expanded support for forest research would result in a substantial increase in benefits flowing from forests and trees.

Apart from the removal of the crippling constraints indicated earlier, and assigning a higher priority for forestry research in the scheme of development action, there are other important and necessary elements, which can contribute to enhance the effectiveness of research. Scientists involved in forestry research should explain and propound the results of their research, and be responsive to the constructive criticism from their clients.

It is the primary responsibility of the research managers to prove to their potential clients and to convince the political leaders and policy makers that research is a tool available to the forestry sector, which can be used very effectively to improve the sector's contribution to the society, and to support sustainable national development. Research and development efforts should not only be problem-oriented but also should be anticipatory and aim at harnessing future opportunities before the real problems appear in the field.

- Full functional autonomy of research organisations will help to introduce better systems of research management and goal-orientation, and thus to improve accountability; and will also serve as an incentive for better performance. It could also help the institutions to become self-financing in the long run.

- Active involvement of clients/users/beneficiaries in problem identification, need assessment, priority setting, and monitoring of activities will ensure end-user linkage and enhance the impact of research.

- A clear policy, strategy and perspective plan for forestry research (and for technology development and transfer) at the national level, specifying the roles of different institutions and establishing networks and co-ordination mechanisms are an essential element sectoral development.

- A comprehensive R&D plan for forestry linking long/medium/short term objectives, programmes, and activities (specific projects) is essential, and it should be in tune with the national development objectives and plans. The National Forestry Action Programme - India (1999) specifies five major programmes covering the needs of the forestry sector of the country: protect existing forest resources; improve forest productivity; expand forest area; reduce total demand; and strengthen policy and institutional framework. A comprehensive and complementary research plan should strive to provide support and inputs in achieving the broad programme objectives of the NFAP-India.

- It is necessary to periodically evaluate the contribution of forestry research towards sustainable development, to assess benefit/cost relationships, and to ensure that research results in scientific knowledge, which in turn generates a continuous flow of useful applications and solutions for problems. Ability to conduct strategic evaluation of 'market' conditions and opportunities as it relates to research and technology is an essential characteristic of a successful research institution.

As a unique entity with innovative institutional arrangements and reasonable autonomy, KFRI has been able to carve out a meaningful niche for itself in tropical forestry, and has succeeded, deservedly, in obtaining national and international recognition. Considering the present situation in tropical forestry, and particularly in India, KFRI will have to muster new strength to address the new and emerging challenges as we enter the new millenium. I wish the Institute all glory and success in its onerous task ahead. Let the year-long activities in connection with the Silver Jubilee of KFRI serve as an effective spring-board aiming towards new frontiers of knowledge and new achievements. ■

Did You Know This?

KFRI Offers Customised Refresher /Training Courses in Tropical Forestry and Allied Fields

KFRI offers refresher/training courses to various officers concerened with tropical forestry in one way or the other. The wide range of topics covered include: Present trends in forestry, Agroforestry practices for different agroclimatic regions and criteria for species selection, Management of trees and crops in home gardens, Economics of forest plantations, Economic importance of trees in home-garden agroforestry system, Silviculture of tree species suitable for different end uses , Silviculture of bamboos and rattans, Current trends in seedling production and nursery management, Clonal propagation of teak and eucalypts, Watershed approach and wasteland development, Preservative treatment and seasoning for upgradation of wood quality, Remote sensing, Geographic information system, Weed and disease management in forestry, Insect pest management in forestry, Non-wood forest products (NWFP), Collection and marketing of non wood forest products, Legal provisions in forest conservation and tree farming, Joint forest planning and management (JFPM), Soil and water conservation, Soil nutrient management, Environmental impact of plantations, Wood as a source of energy/industrial material, Forest biotechnology with special reference to tissue, Genetic engineering in forestry, Ecotrourism: a model for sustainable development, Plant and Animal biodiversity . Institutions interested in utilizing such service may contact the Director, Kerala Forest Research Institute, Peechi 680 653, Thrissur, Kerala, India
Fax : (91)(0) 487-282249
Email : libkfri@vsnl.com
Phone : +91 (0) 487-282037

Late - Breaking News.....

KFRI's Silver Jubilee Celebrations Inaugurated

Dr. Neelalohithadasan Nadar, the then Minister of Forests, Govt. of Kerala, inaugurated the year-long celebration of the Silver Jubilee of KFRI on 23 December 1999. Dr. M.R. Das, Chairman and Ex-officio Principal Secretary, Science, Technology and Environment Department, Govt. of Kerala, welcomed the gathering. Dr J.K. Sharma, Director of KFRI, presented an illustrated talk on the "Achievements of KFRI during the last 25 years". Mr. P.C. Baburaj, the Postmaster General, released a first-day cover and a special postal cancellation for Kerala. Smt. Fathima Abdulkhader, President of Thrissur District Panchayat and Shri C.M. Damodaran, President of Pananchery Panchayat extended felicitations to KFRI. The function ended with a vote of thanks by Dr. R.V. Varma, Convenor of the Silver Jubilee Celebrations.

Dr. Neelalohithadasan Nadar, the then Minister of Forests giving Inaugural Address

Released first-day cover and a special postal cancellation on the occasion of inaugural ceremony of the Silver Jubilee year

Several publications were released by KFRI to mark the occasion of its Silver Jubilee Year. They include a Silver Jubilee brochure entitled, "KFRI in the Service of Forestry, Environment and People", a book on "Palms of Kerala", a Handbook on Composting, information bulletins on "Aerobic Composting" and "Sampling and processing of forest soil for analyses" and two pamphlets on KFRI in English and Malayalam.

KFRI now on the Global Net

A website (URL) http://kfri.org has been hosted on the Internet on 7 February 2000. This was inaugurated by the then Minister of Forests, Dr. Neelalohithadasan Nadar. The website provides details on the organisation, divisions, projects, achievements, publications and conferences. There is a feed-back form which allows the browser to make inquiries, give opinions and also place order for publications. The page on " Conferences" gives details of the various conferences planned to be conducted by KFRI. It is possible to send E.mails to the scientists from within the website.

Statistical Consultancy services available at KFRI

Modern scientific research relies extensively on quantitative methods both in measurement and analysis, in studying any natural phenomena. Any scientific research programme to be effective requires the use of well designed experiments or sample surveys coupled with rational modes of inference. Over the past several years, the Kerala Forest Research Institute has built up a strong team of experts, equipment and software to handle many sophisticated statistical design and analysis problems in forestry research and allied fields. The Division of Statistics has a consultative and collaborative role in the projects undertaken by the Institute and is involved in software development for statistical analysis and database management. The Division is headed by Dr .K Jayaraman, who has a wide international experience in tropical forestry.

The Institute likes to share its expertise in this area with other similar institutions around the world on a no-loss-no-profit basis. The Institute can undertake training programmes in statistical methods for forestry professional's surveys and statistical analysis of research data. Institutions interested in utilizing such service may contact the Director, Kerala Forest Research Institute, Peechi 680 653, Thrissur, Kerala, India for further details.

The Director, KFRI can be contacted at:
Fax : (91)(0) 487-282249
E.mail : libkfri@vsnl.com
Phone : +91 (0) 487-282037

Late - Breaking News.....

Local Area Network (LAN) Operational in KFRI

A LAN has been installed in KFRI connecting the computers of all Divisions of the Institute. This facility has been built up with support from the Kerala Forest Department through the World Bank aided Kerala Forestry Project. Dr. Neelalohithadasan Nadar, the then Minister of Forests, Govt. of Kerala, inaugurated the new facility on 7 February 2000. The facility is expected to improve the scientific communication between the scientists of KFRI and the outside world. E-mail IDs have been provided to all the scientists. More facilities are planned to be built into the system. Full automation of the office administration is also planned through LAN.

Dr. Neelalohithadasan Nadar, the Minister for Forests inaugurating the LAN facility at KFRI. Also participated are the other Governing Body members.

International Workshops held

Inbaris -Workshop on Species Utilisation Data Base

INBARIS Workshop participants

An International workshop was organised by Kerala Forest Research Institute in collaboration with International Network for Bamboo and Rattan from 14 to 18 September 1999. The objective of the workshop was to evaluate the data entry format for bamboo and rattan prepared by KFRI Scientists: Drs. K. K. Seethalakshmi, M.S. Mukteshkumar, C. Renuka, R. Gnanaharan, and Mr. A.R. Rajan. The database is designed to cover most of the information available on bamboo and rattan species of the world. Fifteen specialists from 7 countries including Australia, Bangladesh, China, Costa Rica, Kenya, Nigeria, Philippines, representatives from IBPGR and INBAR and nine scientists from KFRI participated in the workshop The deliberations resulted in critical evaluation of the format developed, suggestions for modifications and development of another project to prepare the data base.

Alien Weeds in Moist Tropical Zones: Banes and Benefits

Workshop on alien weeds in moist tropical zones: Banes and benefits, 2-4 November 1999 was organized jointly by KFRI and CABI Bioscience UK, and sponsored by the Department of International Development, UK. Twenty papers were presented. Forty-five participants including five from UK attended the workshop.

Site Management and Productivity in Tropical Forest Plantations

Third workshop on 'Site management and productivity in tropical forest plantations', was held in KFRI during 7-12 December 1999. The workshop was sponsored by CIFOR, Indonesia. Thirty participants attended the workshop including 22 from abroad comprising 7 from Australia, 3 from Congo, 5 from Indonesia, 2 each from China and South Africa and 1 each from Brazil, France and USA.

Please do visit our Website : http://kfri@org and give feed back as our guest

Late - Breaking News.....

Technology Transfer/Training/Refresher Courses organised

KFRI Prepares District Plan Documents on Forests and Biodiversity for People's Plan Campaign

Kerala Forest Research Institute was entrusted with the task of compiling information on forests and biodiversity of the States for incorporating into the Plan documents at district level. Details of the extent of forests and forest plantations, Protected Areas, flora and fauna, forests types, mangroves, sacred groves, and bamboo resources were compiled in each document and submitted to the State Planning Board. A copy of each document was also sent to the respective districts. The section on flora lists the flowering and non-flowering plants and the fungi. The details of mammals, birds, reptiles, amphibians, freshwater fishes and insects are dealt with in the fauna section.

The non-wood forest produce in each district along with the statistics on its marketing and the list of Co-operative Societies are given in the section on Non-Wood Food Products. The section on "Agroforestry" provides information on home-garden forestry in the district and suggestions on suitable plants for the homesteads.

Available information on household consumption of timber and fuel wood and industrial consumption of wood in each district are given under the section Wood Consumption Pattern.

The compilation work was co-ordinated by Dr. P.S. Easa with the contributions made by Drs. U. M. Chandrasekhara, Muktesh Kumar, N. Sasidharan, George Mathew, K.K. Ramachandran, E.A. Jayson, K. Jayaraman, K.K.N. Nair, P. Vijayakumaran Nair, E.J. Maria Florence, C.N. Krishnankutty, P.K. Muraleedharan, A.R.R. Menon and K. Balasubramanian.

Demonstration of cultivation methods of edible mushrooms with leaf litter to the Tribal community at Vazhachal

The Division of Pathology organised a one-day training programme for the benefit of officers and staff of the Central Nurseries of the Kerala Forest Department at Kulathupuzha and Nilambur on mass clonal propagation of eucalypts during December 2000. Drs. M. Balasundaran and E. J. Maria Florence served as resource persons.

Dr. E.J. Maria Florence also provided training to tribal community and local residents of Athirappally Panchayat on "Cultivation of Edible Mushrooms" on 29 November 1999 under the Manaveeyam Programme.

Forest Officers and supporting staff of the Kerala Forest Department as participants of the training progarmme in Field Clonal Facility Centre of KFRI at Kottappara

The Division of Silviculture organised a residential refresher course for 18 Officers (Forestry) of National Bank for Agriculture and Rural Development (NABARD) during 21-26 February 2000. The course was co-ordinated by Mr.. K.C. Chacko. The course content covered a wide range of topics that have been dealt by various experts. They include: Dr. R. Jambulingam, Retired Professor (Agroforestry), Tamil Nadu Agriculture University, Mr. T.M. Manoharan IFS, CCF and MD, Kerala Forest Development Corporation, Mr. P.N. Unnikrishnan IFS, CCF, Kerala Forest Department, Dr. N.K. Vijayakumar, Professor, College of Forestry, Kerala Agriculture University, Mr. K.G. Mohanlal IFS, Director, Ecotourism, Tourism Department and KFRI scientists: Drs. K. Jayaraman, U.M. Chandrashekara, Mamman Chundamannil, , C.N. Krishnankutty, R.C. Pandalai, T. Surendran, T.K. Dhamodaran, . S. Sankar, A.R.R. Menon, U.N. Nandakumar, K.V. Sankaran, R.V. Varma, N. Sasidharan, P.K. Muraleedharan, Thomas P. Thomas, M. Balagopalan, Jose Kallarackal, K.M. Bhat, E.M. Muralidharan, K.K.N. Nair, P.S. Easa.

Late - Breaking News.....

Technology transfer and training for cultivation of medicinal plants

Shri. K.C. Chacko and Dr. R.C. Pandalai prepared a draft leaflet on cultivation and management of medicinal plants for District Panchayat, Thrissur as part of the State Government's Manaveeyam celebrations. The Silviculture Division was also entrusted the task of supplying 25000 seedlings of 10 different medicinal plants. The State Minister of Local Administration Shri Paloli Muhammed Kutty inaugurated the seedling distribution at Nattika. Dr. R.C. Pandalai and Shri P.K. Chandrasekhara Pillai took classes on the cultivation and management of these medicinal plants at homesteads of farmers.

Participants undergoing training in KFRI nursery site of medicinal plants

The Division of Wildlife arranged lectures on different topics in wildlife management, environmental protection and biodiversity conservation for the benefit of: (a) the participants of Nature Camp, Perumbavoor 16 October, 1999 and Intercollegiate Seminar on Nature Awareness, Guruvayoor, 26-28 November 1999 and (b) the forest officials at Mampad , 6-7 November, 1999 and (c) College teachers of Calicut University. Dr. P.S. Easa served as resource person. He also addressed the press persons to brief the research activities of the Division on elephants and man-wildlife interaction.

The Division also organised a training programme for ICFRE scientist trainees in the State Forest Service College, Coimbatore, 1-2 December 1999. Drs. P.S. Easa, K.K. Ramachandran and E. A. Jayson served as resource persons.

The Division of Wood Science, as part of ICFRE Technology transfer programme, conducted ten "Wood Technology Clinics" in 5 districts of Kerala during September-December 1999. The main agencies collaborated include: Grama Panchayats, District Industry Centres, Non-governmental Organisations, R&D Institutions and various Wood Processing Industries. The objectives of the clinics were : (a) to encourage the Local Bodies to initiate wood-processing industries at their level through the People's Planning/Participation Programmes (b) to popularise the new technologies among the existing wood-based industries for profit-oriented product diversification (c) to distribute promotional literature (KFRI Information Bulletin No.15, "Chila thirangedutha thadisamsakarana sankethika vidyakal") to the participants and (d) to popularise solar drying of timber, ammonia plasticization of wood for bent-wood articles, ammonia fumigation for improved surface colour and simple preservative treatment techniques appropriate for rural areas. Drs. R. Gnanaharan, T.K. Dhamodaran and Mr. P.K. Thulasidas served as resource persons. The target beneficiaries were represented from different institutions which include: Kerala Agriculture University, COSTFORD (Thrissur), Nirmithi Kendra (Thrissur-Chettua), District Industry Centre (Thrissur), Forest Industry Travancore Ltd (Alua), Ollur Grama Panchayath (Ollur), Saw Mill Owner's Association (Perumbavur), KFRI Sub-centre (Nilambur), St. Thomas' College (Thrissur) and Sree Narayana College (Nattika)

Three "Open House" programmes were conducted at KFRI Peechi during September-December 1999 for the interested entrepreneurs to get aquatinted with the facilities available in the Division of Wood Science for industrial wood technology.

The Division of Wood Science also conducted a Wood Technology Training programme including practical for the ICFRE Scientist Trainees, as part of the course in State Forest Service College, Coimbatore during 17 - 20 January and 4 February 2000. Drs. K.M. Bhat, T.K. Dhamodaran and Mr. P.K. Thulasidas served as resource persons.

The Indian Forester Now in CD-ROMs

The Indian Forester is one of the oldest forestry journals in the World. Having commenced its publication in 1875, now it is in its 125th volume. Tens of thousands of articles and research notes on every aspect of Forest and Forestry in India and the neighbouring countries have appeared in this journal. An announcement of the Indian Forester Information System (IFIS) is seen in the recent issue of the Indian Forester. An electronic database of all the articles and research notes published in Indian Forester is available in CD-ROM, a long awaited source of information for researchers in the field of forestry and allied subjects. An immediate access to much of the wanted information is possible. The application package available with the database is capable of searching for specific information based on multiple keywords as well as by the author's name. The IFIS is available for stand alone machine as well as on network environment. The price of the database is Rs. 20,000 for organisations and Rs. 10,000 for individuals. The CD is available from Business Manager, The Indian Forester, P.O.New Forest, Debra Dun 248 006

- KFRI Library

New Releases

Palms of Kerala by C. Renuka, 1999, KFRI Peechi 72p. **Price India: Rs. 300/- Overseas US $ 45**

In Kerala, Palms occur naturally in wild or semi-wild conditions. There are eight indigenous genera of palms with 21 species. In addition, palms are cultivated as cash crops and ornamental plants. Palm population in the wild is decreasing due to habitat destruction and over exploitation. This book describes the indigenous as well as commonly cultivated palms of Kerala to facilitate easy identification of the palms in the natural habitat and in the cultivated form. Distribution, phenology and uses are given separately for each species. Colour photographs are provided for all the species for authentic field identification. An illustrated glossary of the scientific terms used in this book is also included.

Bamboos of India: A Compendium by K.K. Seethalakshmi and M.S. Mukteshkumar, 1998, BIC India, KFRI & INBAR, New Delhi, Price India Rs. 1500/- Abroad US $ 75 + postage.

Bamboo is one of the plant species having multiple uses, growing in the tropics and subtropics of the world. The species supports millions of rural people in their livelihood and is a staple raw material for pulp and paper. India is next to China in species diversity and quantum of production of bamboo. Primarily based on literature survey, this Compendium provides a comprehensive and holistic account of 128 bamboo species belonging to 18 genera occurring in India. Species are arranged under alphabetically arranged genera. Each species has been described to cover every aspect like protologue, vernacular name, description, flowering, distribution and ecology, anatomy and fibre characteristics, chemistry, silviculture and management, natural durability and preservation and uses. The book provides consolidated information about all bamboo species and projects the information gaps clearly. Scientific illustrations of 133 species and colour photographs of common species are given. This forms a good reference book for Indian bamboos.

Conservation of Forest and Wildlife (in Malayalam) by V. Mohammed Kunhi and S.Sankar, 2000, KFRI, Peechi, 85p.

This is a new handbook pubslihed by KFRI for students of nature. The book entitled 'Vana Vanya Jeevi Sampathum Samrakshnavum', written in local Malayalam language, explains what is forest and how it can be conserved and what are the conservation projects related to forestry and the institutions involved in this endeavor.

Multi-tier Forestry: An Innovative Forestry Practice by U.N. Nandakumar, 2000. KFRI Resarch Report no. 186, 95p, Price: Rs. 300/-

A new research report was brought out recently on 'Demonstration-cum-research on multi-tier forestry through Operations Research' is available on sale. For details regarding the report please refer to the article on 'Multi-tier forestry: a promising forestry practice' published in this issue

For ordering copies of above publications please contact: The Librarian, KFRI, Peechi

M. Sc. in Tropical Forestry

The Wageningen Agricultural University (WAU) in the Netherlands is offering a 17-months M. Sc programme in Tropical Forestry, starting every year in September. Core of the programme is the M.Sc thesis research with two specializations: Social Forestry, and Silviculture & Forest Ecology. Applicants should have a B.Sc. in forestry (or equivalent), fluency in English, and preferably working experience. Application for the 2001-2003 programme: before November 15,2000.

Lecturers from different university departments contribute to the programme. The specialization Social Forestry provides opportunities to focus on social, economical extension and policy aspects of the use of trees and forests by rural people. The specialization - Silviculture and Forest Ecology provides opportunities to focus on ecology, silvicultural systems based on natural regeneration, and timber production. Other items can also be chosen, e.g. agroforestry and geographic information systems (GIS). Any individual programme consists of a thesis, research methodology and thesis oriented programmes. In addition, the student is free to include general or specific optional programmes in the individual programme, subject to approval of the Board of Examiners. The thesis research might be conducted within the framework of ongoing development projects in the country of the applicant.

In general students should arrange their own funding. Only for outstanding students the WAU offers a very limited number of fellowships. Other agencies, such as the World Bank, the FAO, ITTO and the European Committee, can provide scholarships as well.

For more information please contact:
Sub-department of Forestry
Director M.Sc. Programme Tropical Forestry Frits J. Staudt
P.O. Box 342, 6700 AH Wageningen, The Netherlands
Phone: (31) 317 47 8015 Fax (31) 317 47 8078 Email: frits.staudt@alg.bosb.wau.nl

Research Updates

Bamboo model houses needed

Among the basic needs of man, shelter stands next to food and clothing. Shelter is also an indicator of living standard in the economic development of a society. Despite the fact that bamboo is a "poor man's timber" and bamboo houses are mostly owned by the economically and socially weaker sections in the society, there has been a decline in the number of bamboo houses in India. With the support of TRADA Technology Ltd. UK, a study was conducted by Drs. P. K. Muraleedharan and V. Anitha, of Economics Division of KFRI, to assess the socio-economic and cultural factors contributing to the non-preference of bamboo for house construction in three states, viz. Kerala. Karnataka and Orissa. The study (KFRI Research Report No. 173) concludes that : (a) forests and homesteads are the two major sources of bamboo supply, (b) bamboo housing sector experiences severe competition from pulp and paper industry which can afford the purchase of bamboo at higher prices (c) about 95 % of the dwellers prefer tiled houses to thatched houses because of durability and low maintenance cost. Apart from the economic sustainability and viability, these houses are popular because of specific preference, acceptability, cultural affinity, affordability and adaptability(d) low income of the people and non-availability of suitable bamboo for construction are the two main reasons for the decline in bamboo housing (e) The governments should popularise bamboo as construction material in state housing schemes by demonstration of model houses of new architectural designs and better aesthetic value with the consideration of local conditions and weather factors.

Acacia mangium - a potential fast growing timber - warrants appropriate silvicultural and wood processing techniques

Acacia mangium is considered by many as "wonder wood". The recent investigations carried out by Dr. T.K. Dhamodaran (Wood Science) and Mr. K.C. Chacko (Silviculture) indicate that it can grow fast only in suitable sites. The average girth (at breast height-GBH) of 112 cm was noted at 10 year-old trees with a range of mean annual increment (MAI) of GBH was 11-18 cm. The mean height of trees varied from 4-9 m at the age of 1 year, to 26.2 m at the age of 10 years; the corresponding MAI in height was in the range of 1.8 - 6.1 m. While the wood being light or moderately heavy, 8-year-old timber was weaker than rubber wood. The wood displayed the defect of heart-rot which affects sawn wood recovery and also needs preservative treatment before use. These findings were published in the KFRI Research Report No. 174 in order to make a preliminary assessment of the performance of this timber in Kerala.

Productivity higher in STM teak plantations?

Based on the data supplied by the Sterling Tree Magnum Ltd. (STM) and the work that could be accomplished during the period between January 1997 and the formal termination of the project in July 1999, the overall mean annual increment (MAI) of height in STM plantations during the initial period of three years of growth was found to be 2.42 m compared to 2.07 m under site quality I of All India Yield Table for teak. The effect of better management seemed to be more pronounced with increasing age. These are the preliminary findings of Dr. K. Jayaraman (Statistics) and Mr. K.C. Chacko (Silviculture), published as KFRI Research Report No. 175, while making an attempt for modeling the growth and real-time monitoring of tree health in STM teak plantations. The overall objective was to develop a Management Information System (MIS) for plantations owned by STM. However, due to premature termination of the project and discontinuity of the sponsorship by STM, further observation could not be made nor could extract more meaningful information. Nevertheless, based on developing a comprehensive format for data collection from the plantations and an effective data processing and information retrieval system, reported were the methods that can be followed for such a study.

Silviculture and harvesting technology for medicinal plants in wastelands

Through a programme supported by National Wasteland Development Board, Ministry of Rural Areas and Employment, Govt. of India, a team of KFRI Scientists - Dr. K.K.N. Nair, Dr. R.C. Pandalai and Dr. U.M. Chandrashekara - attempted to rehabilitate the degraded lands of Palakkad and Thrissur districts using 10 species of medicinal trees, ecologically suitable for the area. The technology developed/ transferred to the beneficiaries and details of the seedling raised and planted are given in KFRI Research Report No. 178. The species tried in the wasteland rehabilitation experiment were *Aegle marmelos* (L.) Corr., *Caesalpinia sappan* L., *Cinnamomum zeylanicum* Breyn., *Oroxylum indicum* (L.) Vent., *Phyllanthus emblica* L., *Pterocarpus santalinus* L.f., *Punica granatum* L., *Saraca asoca* (Roxb.) de Wilde, *Syzyguim aromaticum* (L.) Merr. *et* Perr. and *Wrightia tinctoria* R. Br. The programme was accomplished through active participation of the beneficiaries as well as co-operation of the local agricultural officers of Kerala State Agricultural Department. Training was also given to the farmers in seed processing, nursery establishment, nursery techniques and plantation aspects like aligning, pitting, planting and aftercare of outplanted seedlings. During the project implementation, more than 89,000 seedlings were raised and planted in 45 ha of farmers' and institutional wastelands in the two districts. Species preference by farmers was mostly guided by the size of their land holdings. Small holders preferred species like *Punica granatum* and *Syzygium aromaticum* whereas the large holders preferred *Aegle marmelos*, *Caesalpinia sappan* and *Pterocarpus santalinus* In the case of institutions, species of medicinal use in pharmaceutical industry such as *Aegle marmelos* and *Saraca asoca* were preferred to the other species.

Research Updates

Weather data for Wildlife Sanctuaries accessible at KFRI

As part of initiating several ecological studies, four automated weather stations were installed in 1997 in the Peechi-Vazhani Wild Life Sanctuary, Chinnar Wild Life Sanctuary, Silent Valley National Park and Eravikulam National Park. All the stations started operating in 1997 and the hourly weather parameters were collected from all the stations. These parameters included atmospheric temperature, relative humidity, total solar radiation, wind velocity, wind direction, rainfall and soil temperature at two depths (15 cm & 30 cm). The hourly data on these aspects processed through a computer programme, developed in KFRI, to generate information on daily and monthly averages, maximum and minimum were presented in KFRI Research Report No. 176. The wind velocity and direction could also be determined based on the Windrose diagrams.. According to Drs. Jose Kallarackal and C.K. Somen, scientists of Plant Physiology Division, it is possible to do a number of further analyses using these data to generate more useful information from the Wildlife sanctuaries.

Transfer of clonal technology of eucalypt plantations to the Kerala Forest Department

Clonal forestry has been accepted as a strategy to improve productivity of eucalypt plantations under the Kerala Forestry project funded by the World Bank. As an action oriented programme to supply fast growing disease resistant clonal planting stock of Eucalypts to the Kerala Forest Department, KFRI supplied a total of 44500 ramets of 28 clones. As claimed by a team of scientists consisting of Drs. M. Balasundaran, E.J. Maria Florence, and J. K. Sharma (Pathology), KFRI supplied 16,500 ramets of 15 KFRI clones of *E. tereticornis* and *E. camaldulensis* and 800 ramets of four ITC Bhadrachalam Clones in 1998 for the establishment of the clonal multiplication areas (CMA) and plantations of the Kerala Forest Department (KFRI Research Report 180). Of these, 11500 ramets were planted at Kulathupuzha and 5000 ramets at Nilambur in1.5 x 1.5 m spacing. In 1999, approximately 16000 ramets were supplied for raising plantations in Kodanad Range under Malayattoor Division and 12,000 ramets to Arienkavu range under Thenmala Division. Infrastructure facilities required for clonal multiplication such as mist chamber and hardening units were upgraded at the Eucalypts Clonal Nursery of KFRI at Kottappara.

Recent Publications

Handbook/Chapters in books

Balasundaran, M., Sharma, J.K., Chacko, K.C. (Editors). 1999. Compost for container seedling production in forest nurseries. KFRI Handbook No. 5. KFRI, Peechi, 54p.

Mohammed Kunhi K.V. and Sankar S.2000. Conservation of Forest and Wildlife (in Malayalam) KFRI Handbook No. 6., KFRI, Peechi, 85p.

Scientific Papers

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- Jomy Augustine, N. Sasidharan and M. Sivadasan, 1999. Balsams of Periyar Tiger Reserve, Southern Western Ghats, Kerala. In : M. Sivadasan and Philip Mathew (eds.), *Biodiversity, Taxonomy and Conservation of Flowering Plants*. pp. 275-292. Mentor Books, Calicut.

- Kishore Kumar, K., N. Sasidharan and K. Swarupanandan, 1999. Ethnobotanical Studies on the Hill Tribes in the Shola Forests of High Ranges, Kerala, South India. *J. Econ. Tax. Bot.* 23: 451-465.

- Maria Florence, E.J., Gnanaharan, R. and Sharma, J.K. 1999. Changes in strength properties of rubber wood stained by *Botryodiplodia theobromae* . *Material und Organismen* 32(4):315-319.

- Mercy, K. A. and Jayaraman, K. 1999. Predicting the variation in detection function in line transect sampling through random parameter model. *Environmental and Ecological Statistics*, 6(4): 341-350.

- Muktesh Kumar, K.K. Seethalakshmi & Stephen Sequiera 1999. Two new species of *Ochlandra* Thw. (Poaceae-Bambusoideae) from southern India. *Rheedea* (1): 31-35.

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KFRI Research Reports

- Indira, E.P. 1999. Provenance trial in Acacia. KFRI Research Report No.171.
- Muraleedharan P.K. and Anitha, V 1999 Assessment of economic feasibility and socio-cultural acceptability of bamboo-based architecture : A study in Kerala, Karnataka and Orissa States KFRI Research Report No.173.
- Dhamodaran T.K. and Chacko, K.C. 1999. Growth and wood characteristics of *Acacia mangium* grown in Kerala.KFRI Research Report No. 174.
- Jayaraman, K and Chacko K.C. 1999. Modelling the growth of teak and real-time monitoring of tree health in STM teak plantations. KFRI Research Report No. 175.
- Kallarackal J. and Somen, C.K. 1999. Acquisition of weather data from selected wildlife sanctuaries in Kerala. KFRI Research Report No.176.
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Multi-Tier Forestry: A Promising Forestry Practice

U. N. Nandakumar
Division of Silviculture

Ever-increasing population and rapidly changing life-styles of the people are imposing immense pressure on our forest resources. This has resulted in heavy deforestation and forest degradation all over the world, emphasising the imbalance in demand and availability of forest produce. Existence of large stretches of degraded forests between natural forests and human habitations is a common feature in the tropics, particularly in thickly populated third-world countries. Development of appropriate forestry practices for scientific management of these buffer zone forest areas, ensuring optimum production and utilisation of forest resources in a sustainable manner has become the need of the hour. Intensive multiple use has been suggested by many resource planners as one of the most viable and even inevitable practice for sustainable management of scarce forest resources. Multi-tier forestry with the help of uneven aged forest management of different species having varied characteristics and end-uses provides such an opportunity for optimising production and utilisation.

Multi- tier forest is defined as a forest developed through appropriate human intervention consisting of plant and animal species occupying various layers of the above and below ground ecosystem in an optimal manner to facilitate intensive multiple use. In such a system, various plants, such as trees of varying heights, shrubs, herbs, climbers and grasses, which are most suited to the site conditions and needs of local population are mixed together efficiently in time and space to provide maximum social, ecological and economic benefits.

Through a demonstration plot established at the Kerala Forest Research Institute, Peechi, the problems and prospects of multi-tier forestry as a forestry practice were examined. The complexity of the problem arising out of involvement of large number of species and associated management practices necessitated use of Operations Research approach, which looks at the problem with a holistic perspective from multi-disciplinary and trans-disciplinary angles. Through this study carried out over a period of ten years, the processes involved in transforming a degraded forest area, lying close to human habitation, to a multi-tier forest, which is ecologically sound, economically viable and socially relevant were identified and refined.

Display board highlighting activities of the study

The study has demonstrated multi-tier forestry as a powerful tool for eco-restoration of degraded forest areas, optimising production and promoting sustainable intensive multiple use. Overall increase in growing stock in terms of number of plants per hectare during the ten years of study period was 31 times, of which 46% was through natural regeneration. The number of plant species increased from 15 to 169. Stand basal area increased by four times whereas stand volume by three times. Stand crown area has also increased by three times. Local people collected on an average of 4.5tonnes of green manure, 14.6 tonnes of fodder, 9.16tonnes of fuelwood, 2.56 tonnes of small timber, 1.28tonnes of medicinal produces, 3.85tonnesof teak leaves (for packing purposes) and 155 bamboo culms ha -1 yr. -1 .by 10th year. Cash flow obtained by considering the cost of establishment and the value of materials realised revealed a net cumulative benefit of Rs.54, 741/- during the 10-year period. Apart from production and supply of various materials, such as small timber, fuel wood, fodder and green manure, the multi-tier forestry practice adopted has generated employment of 1095 man-days ha-1 yr.-1, in which 65% was in the form of partial women labour.

Present view of the demonstration plot

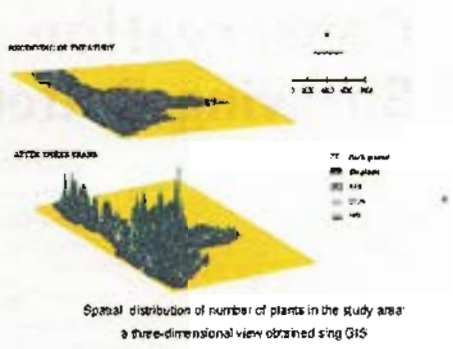
Degraded forests lying close to human habitations was found to be the most ideal site for practicing multi-tier forestry. Here, the demands for various forest produces as well as availability of labour required are the major attractions. Large extents of such areas exist in different parts of the world.

Though quite promising, multi-tier forestry practice was found to have a number of planning and implementation problems. The most critical among them are: (1) decisions involving wider spectrum of plant species and management practices; (2) matching of species and management practices with micro-site conditions at individual plant level; (3) attention to the needs and potentials of neighbouring ecosystems; (4) need for planting stock of large number of species on a continuous basis; (5) yield regulation and harvest scheduling for diverse forest produces; (6) requirement of intensive management; (7) higher labour requirement; (8) implementation problems in harvesting under multi-tier forestry system and (9) lack of availability of technical information on many species and their management techniques.

The strategies identified for development and management of multi-tier forests include (a) transformation of existing degraded vegeta-

Harvesting of forest produce from the plot by local people

tion into a multi-tier forest through regeneration and selective harvesting; (b) choice of species and package of practices that can supplement and complement the ecosystem of influence zone; (c) enhancement of productivity of the site through effective management of soil, water and micro-climate; (d) participation and involvement of local people to minimise biotic pressure, reduce operational cost and ensure effective utilisation of various forest produce; (e) establishment of multi-species nursery to meet requirement of site and adjoining ecosystem on a continuous basis and (f) decentralised planning and execution along with efficient coordination and control at different levels of management.The study also demonstrated the utility of various computer-aided management tools such as GIS based stock-mapping system for site evaluation, continuous inventory system for assess



Spatial distribution of number of plants in the study area a three-dimensional view obtained sing GIS

Spatial distribution of number of plants in the study area : a 3-D view from GIS

ing needs and potential of adjoining influence zone of multi-tier forestry site, silvicultural knowledge base on species and management practices, and modeling tools for decision making. Considering the potential of this forestry practice, further studies are of immediate necessities.

Mimosa invisa - A Growing Menace to Forestry and Agricultural Systems in Kerala

M. A. Sreenivasan and K.V. Sankaran
Division of Plant Pathology

Mimosa invisa (Mimosaceae) an exotic, noxious, fast growing, invasive weed of South American origin - has recently emerged as a new threat to natural forests, forest plantations and agricultural systems in Kerala. The weed is an annual but wherever water is available throughout the year it will grow as a biennial. It has a scrambling stem bearing four or five rows of sharp prickles. Leaves are fluorescent green in colour, small and bipinnate. The inflorescence is a condensed spike (capitate) and pinkish in colour. The weed produces a large number of seeds which have a long viability period.

A survey conducted in Kerala indicated that infestation by *M. invisa* is severe at Vazhachal, Athirapally (Thrissur Dt), Kalady, Kothamangalam, Thundathil (Ernakulam Dt.) Punalur, Anchal and Pathanapuram (Kollam Dt.) Forest Ranges. The weed grows profusely in degraded moist deciduous forests, young plantations of teak and acacia, agroforestry and agricultural systems and fallow lands. Sparse distribution of the weed is also noticed in Mylampulli and Kalladikode villages in Palakkad District and along the road from Kumily to Munnar (Muniappan and Viraktamath, 1993) *M. invisa* is heliophytic in adaptation and hence cannot grow well in areas under closed canopy. In evergreen and semievergreen forests infestation by the weed is seen only in the fringes where canopy is partially or fully open.

M. invisa is moderately drought resistant. The fact that it can invade and cover the ground completely competing with other plants and smothering herbaceous growth implies habitat degradation and loss of biodiversity. *Mimosa* growing areas are impenetrable because of the characteristic thick growth and the stem being armed with sharp prickles. It is reported to be toxic to cattle (Babu, 1990).

Mechanical control of *M. invisa* by manual weeding is difficult and labour intensive. Moreover, the weed can sprout vigorously

from the cut base soon after the onset of monsoon. Attempt to control it using 2,4 D and dinitrobutylphenol (denoseb) in Brazil was not very successful (Lew, 1993). In Australia and Western Samoa, a coried bug, *Scamurius* sp. and a psyllid *Heteropsylla* sp. were used in biocontrol of *M. invisa*. However, these insects are known to attack the spineless variety of *Mimosa* which is used as a cover crop in rubber, cashew, teak and other plantations in the Western Ghats. Hence, attempts are needed to identify fungal pathogens with the potential for biological control of this weed.

References

Babu, A (1990). Flora of Malappuram district. Ph.D thesis, University of Calicut.Lew (1993). 'Alien plants'. PANTS 2, 28-31.
Muniappan, R and Viraktamath, C.A. (1993). Invasive alien weeds in the Western Ghats. Current Science 64, 555-557.

Conservation of the Southern Birdwing Butterfly

George Mathew and Mary Anto
Entomology Division

The birdwings include the largest, most spectacular and magnificent of butterflies. As the name suggests, their large wing span and flight resemble a bird. The female Queen Alexandra birdwing (*Ornithoptera alexandrae*) with a wing span of over 250 mm is the largest butterfly in the world. Some birdwings are iridescent appearing either orange, green, pale blue or pink in colour depending on the angle of view (e.g. *Troides prattorum*).

A total of 46 species of birdwings grouped under the genera *Trogonoptera, Ornithoptera* and *Troides* of the family Papilionidae, comprise the birdwing fauna of the world. Of these, 21 species of the genus *Troides* are confined to the rainforests of South East Asia. Three species are found in India viz. *Troides minos* Cramer (the southern birdwing), *Troides helena Linnaeus* (the common birdwing) and *Troides aecus C.&R.Felder* (the golden birdwing).

Male butterfly

Troides minos Cramer, which is endemic to Western and South-western India, has been listed in Appendix B of the IUCN Red Data Book (1985) as a species requiring continuous monitoring. As part of a project funded by the Ministry of Environment and Forests, New Delhi, investigations are being carried out to study the biology, ecology and behaviour of this butterfly and to suggest strategies for its conservation. The adults of *T. minos* have a wing span of about 140 -180 mm. The forewings are black with whitish shading near the veins. The hindwings differ in the two sexes - in males it is golden yellow with an outer black border while females have an additional row of large discal spots. Adults fly through out the year but are common during the wet season. They feed at the flowers of *Lantana* sp., *Ixora* sp. *Mussaenda* sp. and *Clerodendron capitatum*. Males of the species exhibit territorial behaviour like patrolling, perching and chasing. This is a strategy to maximum successful matings as freshly enclosed females usually visit these areas for feeding .

Female butterfly

The pale orange eggs are laid singly on the underside of leaves and occasionally on stems and neighboring plants. Eggs are about 2 mm in diameter and hatch in 7 to 9 days. On hatching, the larva consumes most of the egg shell before feeding on the tender leaves of the host. The eggs are occasionally parasitized by hymenopterans in the field.

The larvae are velvety rosy black in colour and possess fleshy orange tipped tubercles and a lateral band between segments 8 and 9 . The larval period lasts for 28-35 days. The early instar larvae are susceptible to predation by ants while late instars are preyed upon by birds. The fully grown larva spins a silk tail pad and girdle prior to pupation and is thus suspended at an angle. The larval host plants are *Aristolochia* sp. and *Thottea* sp. (Aristolochiaceae).

The pupa is pinkish brown in colour and has a yellow patch and prominent keels or tubercles. When disturbed the pupa makes a distinct hissing sound caused by the friction of the abdominal segments rubbing against each other. The pupal period lasts about 20-24 days.

A conservation strategy for the butterfly is underway based on the introduction of the larval host plants and maintenance of habitat required for territory establishment. Monitoring of the population to understand the spatial distribution of the species in the Peechi-Vazhani forest area is being carried out. The causes of mortality of juveniles in the field and under laboratory conditions is also being investigated. The possibility of obtaining matings in captivity is another aspect, which is being looked into.

Thus, the study on the ecology and behaviour of this marvelous butterfly will give us fresh insights into the conservation and its fragile habitat.

Reference

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Avifauna of KFRI Campus

E. A. Jayson, K.K. Ramachandran and C. Sivaperuman
Division of Wildlife Biology

The KFRI campus with about 28 ha, is located at 10° 32' N latitude and 76° 20' E longitude with average elevation of about 100 m above MSL,. The vegetation of the campus is composed of moist deciduous forest and plantations of teak (*Tectona grandis*) and irul (*Xylia xylocarpa*). Other important tree species are *Hopea parviflora, Dalbergia latifolia* and *Terminalia paniculata.* Reported below is a list of birds prepared based on our observations covering many years. Birds are categorized as Common, Uncommon, Occasional, Resident and Migrant. The criteria are based on the following parameters.

C = Common (found in all the habitats throughout the year)
U = Uncommon (Seen in specific habitat in few months)
O = Occasional (Seen in suitable habitat on few occasions)
R = Resident birds which are breeding in Kerala
M = Birds which are winter visitors

A total of 94 taxa of bird belonging to 13 Orders and 35 Families were recorded from the area (as given in Table, the common names and scientific names followed are as given in the book, R.J. Ranjit Daniels (1997), A *field guide to the birds of Southwestern India).* Of total species, 86 are resident and 8 are migrant. Eurasian sparrow hawk, Indian cuckoo, Indian pitta, Indian redrumped swallow, Eurasian golden oriole, Asian paradise flycatcher, Grey wagtail and Yellow wagtail are the migrants. Among them the behaviour of Indian cuckoo is worth mentioning. This bird commonly known as "Vizhupakshi" arrives in the campus regularly in the month of March and leaves by the end of May. Indian redrumped swallow builds mud nests in the Economics-Statistics block of KFRI buildings. Common myna, Jungle myna, Plumheaded parakeet, Roseringed parakeet, Purple sunbird and Crested serpent eagle are some of the species, which breed in the campus. Medicinal plant garden is an ideal habitat for smaller birds like sunbirds and flowerpeckers.

List of birds

Sl. No	Common name	Scientific name	Status
	Order: Falconiformes		
	Family: Accipitridae		
1.	Black kite	*Milvus migrans*	R,C
2.	Brahminy kite	*Haliastur indus*	R,C
3.	Shikra	*Accipiter badius*	R,C
4.	Eurasian sparrowhawk	*Accipiter nisus*	M,U
5.	Crested serpent eagle	*Spilornis cheela*	R,C
	Order: Galliformes		
	Family: Phasianidae		
6.	Jungle bush quail	*Perdicula asiatica*	R,C
7.	Grey francolin	*Francolinus pondicerianus*	R,C
8.	Red spur fowl	*Galloperdix spadicea*	R,C
9.	Grey jungle fowl	*Gallus sonneratii*	R,U
10.	Pea fowl	*Pavo cristatus*	R,O
	Order: Gruiformes		
	Family: Rallidae		
11.	Whitebreasted waterhen	*Amaurornis phoenicurus*	R,O
	Order: Columbiformes		
	Family: Columbidae		
12.	Rock pigeon	*Columba livia*	R,C
13.	Spotted dove	*Streptopelia chinensis*	R,C
14.	Eurasian collared dove	*Streptopelia decaocta*	R,C
15.	Yellowfooted green pigeon	*Treron phoenicoptera*	R,U
16.	Emerald dove	*Chalcophaps indica*	R,C
	Order: Psittaciformes		
	Family: Psittacidae		
17.	Roseringed parakeet	*Psittacula krameri*	R,C
18.	Plumheaded parakeet	*Psittacula cyanocephala*	R,C
19.	Malabar parakeet	*Psittacula columboides*	R,C
20.	Vernal hanging parrot	*Loriculus vernalis*	R,C
	Order: Cuculiformes		
	Family: Cuculidae		
21.	Pied cuckoo	*Oxylophus jacobinus*	R,C
22.	Common hawk-cuckoo	*Cuculus varius*	R,C
23.	Indian cuckoo	*Cuculus micropterus*	M,O
24.	Banded bay cuckoo	*Cacomantis sonneratii*	R,C
25.	Indian koel	*Eudynamys scolopacea*	R,C
26.	Greater coucal	*Centropus sinensis*	R,C
	Order:Strigiformes		
	Family: Strigidae		
27.	Barn owl	*Tyto alba*	R,C
28.	Spotted owlet	*Athene brama*	R,C
	Order: Caprimulgiformes		
	Family: Caprimulgidae		
29.	Grey nightjar	*Caprimulgus indicus*	R,U
30.	Indian nightjar	*Caprimulgus asiaticus*	R,C
	Order: Apodiformes		
	Family: Apodidae		
31.	Alpine swift	*Tachymarptis melba*	R,C
32.	Little swift	*Apus affinis*	R,C
33.	Asian palm swift	*Cypsiurus batasiensis*	R,U
	Order: Coraciiformes		
	Family: Alcedinidae		
34.	Pied kingfisher	*Ceryle rudis*	R,C
35.	Common kingfisher	*Alcedo atthis*	R,C
36.	Storkbilled kingfisher	*Pelargopsis capensis*	R,U
37.	Whitethroated kingfisher	*Halcyon smyrnensis*	R,C
	Family: Meropidae		
38.	Bluetailed bee-eater	*Merops philippinus*	R,C
39.	Little green bee-eater	*Merops orientalis*	R,U
40.	Chestnutheaded bee-eater	*Merops leschenaulti*	R,C
	Family: Coraciidae		
41.	Indian roller	*Coracias benghalensis*	R,O
42.	Eursian hoopoe	*Upupa epops*	R,O
	Family: Bucerotidae		
43.	Indian grey hornbill	*Ocyceros birostris*	R,U
	Order: Charadriiformes		
	Family: Charadriidae		
44.	Redwattled lapwing	*Vanellus indicus*	R,U
	Order: Piciformes		
	Family: Capitonidae		

45.	Whitecheeked barbet	*Megalaima viridis*	R,C
46.	Coppersmith barbet	*Megalaima haemacephala*	R,C
	Family: Picidae		
47.	Blackrumped flameback	*Dinopium benghalense*	R,C
48.	Browncapped woodpecker	*Dendrocopus nanus*	R,U
49.	Rufous woodpecker	*Cileus brachyurus*	R,C
50.	Yellowcrowned woodpecker	*Dendrocopus mahrattensis*	R,C
51.	Heartspotted woodpecker	*Hemicircus canente*	R,C
	Order: Passeriformes		
	Family: Pittidae		
52.	Indian pitta	*Pitta brachyura*	M,O
	Family: Alaudidae		
53.	Rufouswinged bushlark	*Mirafra assamica*	R,C
	Family: Hirundinidae		
54.	Barn swallow	*Hirundo rustica*	R,C
55.	Indian redrumped swallow	*Hirundo daurica*	M,C
	Family: Oriolidae		
56.	Eurasian golden oriole	*Oriolus oriolus*	M,C
57.	Blackhooded oriole	*Oriolus xanthornus*	R,C
	Family: Dicruridae		
58.	Black drongo	*Dicrurus macrocercus*	R,C
59.	Ashy drongo	*Dicrurus leucophaeus*	R,C
60.	Whitebellied drongo	*Dicrurus caerulescens*	R,C
	Family: Artamidae		
61.	Ashy wood swallow	*Artamus fuscus*	R,C
	Family: Sturnidae		
62.	Common myna	*Acridotheres tristis*	R,C
63.	Jungle myna	*Acridotheres fuscus*	R,C
	Family: Corvidae		
64.	Rufous tree pie	*Dendrocitta vagabunda*	R,C
65.	House crow	*Corvus splendens*	R,C
66.	Largebilled crow	*Corvus macrorhynchos*	R,C
	Family: Campephagidae		
67.	Scarlet minivet	*Pericrocotus flammeus*	R,C
	Family: Irenidae		
68.	Common iora	*Aegithina tiphia*	R,C
69.	Bluewinged leafbird	*Chloropsis cochinchinensis*	R,U
	Family: Pycnonotidae		
70.	Redwhiskered bulbul	*Pycnonotus jocosus*	R,C
71.	Redvented bulbul	*Pycnonotus cafer*	R,C
	Family: Muscicapidae		
72.	Yellowbilled babbler	*Turdoides affinis*	R,C
73.	Jungle babbler	*Turdoides striatus*	R,C
74.	Asian paradise flycatcher	*Terpsiphone paradisi*	M,C
75.	Common tailor bird	*Orthotomus sutorius*	R,C
76.	Clamorous warbler	*Acrocephalus stentoreus*	R,C
77.	Blyth's reed warbler	*Acrocephalus dumetorum*	R,U
78.	Indian robin	*Saxicoloides fulicata*	R,C
79.	Orintal magpie robin	*Copsychus saularis*	R,C
80.	Pied bushchat	*Saxicola caprata*	R,C
	Family: Paridae		
81.	Great tit	*Parus major*	R,C
	Family: Sittidae		
82.	Velvetfronted nuthatch	*Sitta frontalis*	R,C
	Family: Motacillidae		
83.	Grey wagtail	*Motacilla caspica*	M,C
84.	Whitebrowed wagtail	*Motacilla maderaspatensis*	R,C
85.	Yellow wagtail	*Motacilla flava*	M,U
	Family: Dicaeidae		
86.	Palebilled flowerpecker	*Dicaeum erythrorhynchos*	R,C
87.	Thickbilled flowerpecker	*Dicaeum agile*	R,C
	Family: Nectariniidae		
88.	Purplerumped sunbird	*Nectarinia zeylonica*	R,C
89.	Purple sunbird	*Nectarinia asiatica*	R,C
90.	Longbilled sunbird	*Nectarinia lotenia*	R,C
	Family: Zosteropidae		
91.	Oriental white-eye	*Zosterops palpebrosa*	R,C
	Family: Ploceidae		
92.	Chestnutshouldered petronia	*Petronia xanthocollis*	R,C
93.	Baya weaver	*Ploceus philippinus*	R,C
94.	Streaked weaver	*Ploceus manyar*	R,C

C = Common, U = Uncommon, O = Occasional, R = Resident, M = Migrant

Campus News

Training Imparted

Training/Technology transfer for cultivation of medicinal plants

Mr. K.C. Chacko and Dr. R.C. Pandalai (Silviculture Division), as part of the State Government's Manaviyam celebrations, prepared a draft leaflet on cultivation and management of medicinal plants for the District Panchayat, Thrissur. The Division was entrusted the task of supplying 25000 seedlings of 10 different species of medicinal plants. The State Minister of Local Administration Mr. Paloli Muhammed Kutty inaugurated the seedling distribution at Nattika. Dr. R.C. Pandalai and Mr. P.K. Chandrasekhara Pillai took classes on the cultivation and management of these medicinal plants at homesteads of farmers. Mr. K.C. Chacko also coordinated on the job training programme of four IFS Probationers of 1997 Batch on 30 November and 1 December 1999.

Messers K.C. Chacko and U.N. Nandakumar (Silviculture Division) coordinated the study visit of 33 IFS Probationers from IGNFA, Dehra Dun on 30 November 1999.

Dr. R.C. Pandalai coordinated the visit of 32 students and staff of the University of Horticulture and Forestry, Nauni on 11 January 2000.

Dr. R.C. Pandalai and Mr. U.N. Nandakumar coordinated the study visit of M.Sc. and B.Sc. (Botany) students of Sree Narayana College, Nattika on 19 February 2000.

Mr. U.N. Nandakumar coordinated the study tour of 16 Final Year B.Sc. Forestry students from Konkan Agricultural University, Dapoli, Maharashtra on 29 January 2000. He also organised the visit of 13 research staff lead by Shri K Venkaiah, State Silviculturist, Rajamundry, Andhra Pradesh on 18 November, 1999 and the junior batch of Forest Range Officer trainees from Walayar at KFRI on 25 February, 2000.

Campus News

New Research Projects

KFRI 333/99 : Field trials for controlling *Mikania* infestation in forest plantations and natural forests in Kerala.

Investigators: K. V. Sankaran, M. Balasundaran, R. C.Pandalai and Officials of Kerala forest Department.

Duration : 3 years (September 1999-August 2002).

Sponsored by: Kerala Forest Department.

KFRI 335/2000. Demonstration, mass production, formulation and application of a baculovirus for management of the teak defoliator, *Hyblaea puera*

Investigators : V.V. Sudheendrakumar, R.V. Varma, K. Mohanadas and T.V. Sajeev

Duration : 3 years (Jan. 2000 - December 2002)

Sponsored by : Department of Biotechnology, Ministry of Science & Technology, New Delhi.

KFRI 342/2000: Identification of promising provenances of new fast growing species and development of new eucalypt and Acacia clones for establishment of clonal multiplication area (CMA).

Investigators: M. Balasundaran, J.K. Sharma and E.J. Maria Florence.

Duration : 2 years.

Sponsored by : Kerala Forest Department.

Seminars/Symposia/Workshops

Dr. M. Balagopalan (Soil Science Division) participated in the following events:

- the National Symposium on Forestry Towards 21st Century held at TNAU Coimbatore, 27-28 September, 1999 and presented a paper on "Soils across different vegetal types in the two elevational zones of Western Ghats, Kerala
- IX Swadeshi Science Congress held at Kollam, 5-7 November, 1999 and presented a paper entitled "Distribution of total and different forms of sulphur in relation to elevation in the Western Ghats".
- XII Kerala Science Congress held at Kumily, 27-29 January, 2000 and presented a paper entitled "Variation in soil properties associated with high elevational grasslands in the Western Ghats, Kerala" by Balagopalan and Rugmini P.
- Regional Workshop on Watershed, Development, Management and Evaluation in the Western Ghats region of India at CWRDM, Calicut, 28-29 February, 2000.

Drs. M. Balagopalan, Thomas P Thomas and M.P. Sujatha (Soil Science Division), attended Regional Contact Workshop on Natural resources Data Management Systems held at CESS, Trivandrum on 30 October, 1999.

Drs. M. Balasundaran and **K.V. Sankaran** (Pathology Division) attended the Silver Jubilee Seminar organized by the Kerala Forest Development Corporation during 24-25 May, 2000 at Kumily, Kerala. Dr. Balasundaran presented a paper entitled, "Fungal problem in Eucalyptus plantations" and Dr. K.V. Sankaran presented a paper - " On the effect of weeds on productivity of forest plantations".

Drs. M. Balasundaran and E.J. Maria Florence (Pathology Division) attended the National Symposium on forestry towards the 21st century organized by the Tamil Nadu Agricultural University, Coimbatore on 27-28 September, 1999.

Dr. KM Bhat (Wood Science) attended the INBAR Workshop on Bamboo/Rattan data base held at Peechi / Trichur during 13-17 September, 1999. He also participated in the Timber Sectional Committee CED 9 and its subcommittee meetings of Bureau of Indian Standards held at Bangalore , 24-25 November, 1999 and presented two draft standards on rattan grading rules for adoption.

Dr. K. M. Bhat (Wood Science), **Mr. K.C. Chacko** (Silviculture), **Dr. K. K. Seethalakshmi** (Physiology) and **Mr. K.V. Muhammed Kunhi** (Agroforestry and Publicity) attended the National Workshop on Transfer of Forest Technology, IFGTB, Coimbatore , 16-17 December, 1999. Dr. Bhat presented an invited paper on "Technology transfer for forest utilisation in the new millennium".

Mr. K.C. Chacko (Silviculture Division) attended the KFDC Silver Jubilee Seminar at Kumily, 24-25 January, 2000 and presented a paper on "Sustainable management of pulpwood plantations with special reference to eucalypts" by K.C. Chacko, K.V. Sankaran and R.C. Pandalai.

Dr. U.M. Chandrashekara (Agroforestry & Publicity Division) participated in :

(a) Workshop on Alien weeds in moist tropical zone: banes and benefits held at KFRI, 2-4 November, 1999 and presented a paper on " *Lantana camara* in Chinnar Wildlife Sanctuary, Kerala, India".

(b) First Biennial Conference on ecological economics for sustainable development, at Bangalore organised by the Indian Society for Ecological Economics Society , 22-24 December,1999.

(c) Workshop organised by the Tropical Soil Biology and Fertility - South Asian Regional Network (TSBF-SARNET) , 5-6 January, 2000 in School of Environmental Sciences, JNU, New Delhi for the formulation of a multi-country proposal on managing agrobiodiversity for sustainable land use and global environmental benefits.

(d) National Workshop on Community strategies for management of natural resources held at Indira Gandhi Rastriya Manava Sangrahalay, Bhopal 21-23 January, 2000 and presented a paper on " Ecological dimensions of sacred groves".

Dr. P.S. Easa (Wildlife) participated in:

(a) Seminar on Intellectual Property Rights at Rajiv Gandhi Centre for Biotechnology on 9 November, 1999

(b) Workshop on Satellite Tracking , 12-20 December

(c) Eco-development workshop of Periyar Tiger Reserve, 12 January 2000

(d) Management Plan Initiation Workshop of Thattekkad Bird Sanctuary, 23 November 1999, .Idukki Wildlife Sanctuary,16 January, 2000 and Eravikulam National Park, 17 January, 2000 .

Dr. E.A. Jayson (Wildlife Division) attended the Workshop on "Important Bird Area" organised by Bombay Natural History Society at Topslip , 13 - 14 November, 1999 and participated in the Annual Research Seminar of SACON,1 - 2 February, 2000.

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Dr. Jose Kallarackal, (Physiology Division) participated in the National Seminar on Meteorology entitled Tropmet 2000 held at Cochin , 1-4 Feb, 2000 and presented a paper entitled, "Microclimate Studies in an Altitudinal Gradient in the Western Ghats Mountain Ranges of Peninsular India" by Kallarackal J. and Somen, C.K. He also participated in the Regional Workshop on "Watershed Development, Management and Evaluation in the Western Ghats Region of India", 28-29 February, 2000 at CWRDM, Kozhikode, and presented a paper entitled. "Impact of converting natural vegetation into plantations on the watershed hydrology of the Western Ghats of India".

Drs. Jose Kallarackal and **C. K. Somen**, (Physiology Division) participated in the National Symposium on Forestry towards 21st century held at TNAU, 27-28 September, 1999 and presented a paper entitled, "Eco-physiological studies to improve eucalypt plantations" by J. Kallarackal and C.K Somen.

Dr. C. Mohanan (Pathology Division) attended the Indian Phyto-pathological Society Southern Zone Annual Meeting and Symposium at CPCRI, Kayamkulam during 14-16 December, 1999 and presented a paper on" Diseases of forest plantation species in South India and their management".

Dr. M.P. Sujatha (Soil Science Division) participated in the National Workshop on promotion of bamboo for development of wastelands, at Indira Gandhi Agricultural University, Raipur, 20-21 January, 2000 and presented a paper entitled "Reed bamboo for rehabilatating the degrading lands in Kerala" by M.P. Sujatha, Thomas P. Thomas and S. Sankar.

Dr. M.S. Muktesh Kumar (Botany Division) participated in the 9th annual conference of IAAT and National seminar *on Plant Systematics, Biodiversity, Conservation & Ethnobotany*, held at Calicut University, 18-19 December 1999 and presented a paper entitled " Native bamboos of south India - Their diversity, taxonomy and ethnobotany: A fresh perspective" by M.S. Muktesh Kumar and M. Remesh. He also participated in the INBAR International meeting for project formulation on species utilization data base for bamboo and rattan, during 14-18 September, 1999 and presented a status paper on the Taxonomy of bamboos.

Dr. E.M. Muralidharan (Genetics Division) attended the International Tree Biotechnology Meeting held at National Chemical Laboratory, Pune , 17-19 November, 1999. He has also participated in the brain storming session - biotechnology of Spices and Plantation Crops held at the Indian Institute of Spices Research , Calicut , 17-18 January, 2000.

Dr. R.C. Pandalai (Silviculture Division) participated in the following events:

(a)Workshop on "Western Ghats development" 22-23, September, 1999 organised by the Western Ghat Development Cell, Thiruvananthapuram.

(b) III National Congress on Medicinal Plants, Thrissur on 27 December 1999 organised by Oushadhi, Thrissur and STEC, Government of Kerala.

(c) Workshop on "Participatory Forest Management" (World Bank aided) at Nemmara Forest Division and took a class on Forest degradation during 25-27 December, 1999.

(d) III National Congress on Medicinal Plants organized by STEC and Oushadhi on 27 December, 1999.

Dr. A.R.R. Menon (Ecology Division) and **Mr. U.N. Nandakumar** (Silviculture) attended a meeting on "Application of Remote Sensing and GIS in Natural Resource Management in Kerala" on 18 January 2000, VSSC, Thiruvananthapuram

Mr. U.N. Nandakumar (Silviculture Division) attended a one-day workshop on 'Oracle 8i'. Organised by M/s. 'Krans International' and 'M/s. Oracle Corporation (India)' Jan. 2000, Thiruvananthapuram

Dr. K.K. Ramachandran (Wildlife Division) participated in the Workshops for the preparation of Management Plan of Idukki Wildlife Sanctuary and Eravikulam National Park, 17-18 January, 2000.

Dr. N. Sasidharan (Non-wood Forest Products Division) participated in the Regional Workshop on Sustainable Use of Bio-resources, 24-26 October, 1999. Sri Lanka and presented a paper on "Bio-diversity and Sustainable Use of Non-Wood Forest Products in the Western Ghats, South India" by N. Sasidharan, P. K. Muraleedharan and K. K. Seethalakshmi. He also participated in the III National Congress on Medicinal Plants organised by OUSHADI, Thrissur on 27/12/1999 and presented a paper "Status of Medicinal Plants in Medicinal Plant Conservation Areas in Kerala" . In addition, he participated in a Seminar on "Prospects of Forest Development Corporations in the New Millennium", 24,25 January, 2000 Kumily and presented a paper on "Commercial Cultivation of Medicinal Plants".

Dr. Thomas P. Thomas (Soil Science Division) attended the Workshop on Western Ghats Development, 22-23 December, 1999 at Peechi. He also participated in the Regional Contact Workshop on Natural resources Data Management Systems held at CESS, Trivandrum on 30 October, 1999.

Dr.R.V.Varma (Entomology Division) participated in the following meetings:

(a) the Satellite meeting on preparation of a Manual on preservation of bamboo 16-17 Sept. 1999 at Trichur, organized by INBAR. He also attended the second Working Group meeting for the above purpose at IWST, Bangalore from 21-23 Feb. 2000.

(b) Workshop on Western Ghat development, 22-23 Sept. 1999 and helped in the preparation of a document for the Working Group on Ecotourism.

(c) Workshop on Integrated management of Coastal zones from 29 Feb- 2 March, 2000 at Cochin, organized by CUSAT and Technical University of Delft, The Netherlands.

Best paper presentation awards

The paper/poster on " Native bamboos of South India - their diversity, taxonomy and ethnobotany: a fresh perspective" by **M.S. Muktesh Kumar and M. Remesh** was adjudged as the best poster presentation for the Dr. S.R. Yadav award in the National seminar *on Plant Systematics, Biodiversity, Conservation & Ethnobotany*, held at Calicut University, 18-19 December, 1999.

Dr. N. Sasidharan (Non-wood Forest Products) bagged the best paper presentation award for his paper "Status of Medicinal Plants in Medicinal Plant Conservation Areas in Kerala", in the 3rd National Congress

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on Medicinal Plants organised by OUSHADI, Thrissur on 27 December, 1999.

Fellowship

Dr. J. Kallarackal (Plant Physiology) was awarded a Crawford Foundation (Australia) Fellowship to do collaborative research with CSIRO scientists at Perth, Canberra and Mount Gambier during October-November 1999.

Guest Lectures/Training

Dr. M. Balasundaran (Pathology Division) served as resource person for a training programme on "Production and Application of Biofertilizers in agriculture" organized by Kerala Agricultural University, Vellanikkara for Agricultural Officers.

Dr. P.S. Easa (Wildlife) served as a resource person in the regional training programmes for Western Ghats Plan Implementing Officers of the Southern Region at Arippa ,11 - 12 October, 1999, for Northern Region at Muthanga, 21-22 October, 1999 and for Central Region at Peechi, 31 September -1 October, 1999. He was also the resource person of the Training Programme for the college teachers on Biodiversity Monitoring Programme at Aralam Wildlife Sanctuary 26 - 28 February, 2000.

Dr. J. Kallarackal (Plant Physiology) delivered a talk entitled, "Water use problems of eucalypts planted in Kerala" at CSIRO Division of Forestry and Forest Products, Canberra, Australia on 16 November, 1999.

KFRI Seminars

As part of the Silver Jubilee Celebrations, the following lecture series were oragnised in KFRI:

Dr. Marta Vannucci, Vice-President, International Society for Mangrove Ecosystems, Japan gave a talk on "Research and Management of Mangrove Ecosystems" on 14 January, 2000

Dr. J. Tim O'Meara, Obermann's Centre for Advanced Studies, University of Iowa, USA gave a talk on "Advantages of Farm Forestry over Commercial Plantations" on 31 January, 2000.

Mr. Rowan Reid, Senior Lecturer, School of Forestry, Melbourne University, Australia. Gave a lecture on " Australian Farm Forestry - Why pruning must be fun, not just economic" on 11 February, 2000

New Appointment

Mr. S. Rajeev has joined KFRI as Deputy Registrar (Accounts) on 19 April 2000.

Ph.D. Awards

Mrs. Ancy Mathew was awarded Ph. D. degree by the Calicut University for her thesis on "Structure and behaviour of Indian rattans", prepared under the guidance of Dr. K. M. Bhat (Wood Science Division).

Mrs. E.P. Indira , Scientist-in-Charge, Genetics Division, was awarded Ph.D. degree by the Calicut University for her thesis "Studies on the variability of the species *Gmelina arborea* Linn". She was guided by Dr. C. Renuka, , (Botany Division).

Mr. C. N. Krishnankutty, Scientist, Statistics Division, was awarded Ph.D. degree by the Calicut University for his thesis "Demand supply and price of teakwood in Kerala".

Mrs. M.P. Sujatha, Scientist, Soil Science Division was awarded Ph. D. degree by Kerala Agricultural University for her thesis "Characterisation of soils under reed (*Ochlandra travancorica* Benth) in the Western Ghats.

Mr. T. Surendran, Scientist, Plant Physiology Division was awarded Ph.D by the FRI-Deemed University-Dehra Dun for his thesis on "Clonal Propagation of Eucalyptus in Kerala", prepared under the guidance of Dr. J.K. Sharma, Director, KFRI.

Mr. S.M. Vairavel was awarded Ph.D. degree by FRI Deemed University, Dehra Dun for his thesis on "Ecology of gaur (*Bos gaurus* H. Smith) with special reference to habitat utilization", prepared under the guidance of Dr. P. S. Easa (Wildlife Division).

Awards/ Honours

IUFRO Scientific Achievement Award to KFRI Scientist

Dr. K. M. Bhat (Wood Science Division) was elected for the IUFRO Scientific Achievement Award, that will be presented in the XXI IUFRO World Congress, 7 - 12 August 2000, Kuala Lumpur, Malaysia. The award consists of gold medal, a scroll and cash honorarium. This award, while recognising his personal achievements, will bring great credit to KFRI and the country.

Membership in Indian National Science Academy (INSA)

Dr. M. S. Muktesh Kumar (Botany Division) was nominated as a member of Indian National Science Academy

Obituary
Shri V.S. Srinivasan
(1951-2000)

It is with profound sadness that we announce the untimely death of Shri V. S. Srinivasan on 9 March 2000. He died in his residence - Alukkal House leaving his wife and two daughters. In his death, KFRI has lost a very sincere and diligent employee, who served as an Attender with highest devotion to his duties over the past 21 years since 24 January 1979.

May the Almighty give the strength and comfort to his bereaved widow and other members of the family.

K.M.B

EVERGREEN

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Editor
Dr. K. M. Bhat

Associates
Dr. E.J. Maria Florence
Dr. T.K. Dhamodaran
Dr. C.N. Krishnankutty
Mr. Subhash Kuriakose

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Address all communications to:
The Editor, Evergreen,
Kerala Forest Research Institute,
Peechi - 680 653, Thrissur, Kerala,
India.
Ph: 0487-282037, 282061
Fax : 0487-282249
E.mail : kmbhat@kfri.org
URL : http://kfri.org

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Coming Events

- 2-4 August 2000. International Symposium on tropical forestry research: challenges in the new millennium, Peechi, India. Contact: Dr. J. K. Sharma, KFRI, Peechi 680 653, Kerala, India Tel: 91-487-282061; Fax: 91-487-282249; Email: jbkfri@vsnl.com
- 2-4 August 2000. Bamboo 2000 International Symposium. Chiang Mai, Thailand. Contact: Bamboo 2000 Secretariat, Faculty of Forestry , Kasetsart University, Bangkok 109000 Thailand; Tel 66-2-5790171; Fax 66-2-942 8112; Email fforlwp@nontri.ku.ac.th
- 5-6 August 2000. Improved Forest Management and Harvesting Practices for Tropical Forest. IUFRO/ FAO Satelite meeting. Kuala Lumpur, Malaysia. Contact: R. Heinrich, Forest Harvesting, Trade and Marketing Branch, FAO Forest Harvesting. Trade and Marketing Branch, FAO Forestry Department, Viale delle Terme di Caracalla, 00100 Rome, Italy; Fax 39-6-5705 5137;Email Forest-Harvesting @FAO.org
- 7-12 August 2000. The Effect of Nursery and Silvicultural Operations on the Environment and Society. IUFRO 3.02.00 at the XXI IUFRO Wold Congress, Kuala Lumpur, Malaysia. contact: Mike Menzies, New Zealand Forest Research Institute Ltd, Biotechnology Division, Private Bag 3020, Rotorua, New Zealand; Tel 64-7-3475899; Fax 64-7-3479380; Email menziesm@tawa.fri.cri.nz
- 7-12 August 2000. Kuala Lumpur, Malaysia. Data collection in the Tropics. IUFRO 4.02.01 at the IUFRO World Congress. Contact: Mohammed Ellatifi, service des Eaux Forests, PB 12507 Casablance, Marocco; Fax 212-2-982428; Email m.ellatifi@mailcity.com
- 7-12 August 2000. XXI IUFRO Word Congress 2000. Kuala Lumpur, Malaysia. Contact: XXI IUFRO World Congress Organizing Committee, Forest Research Institute Malaysia, Kepong, 52109 Kuala Lumpur, Malaysia; Fax 60-3-636 7753; Email iufroxxi@frim.gov. my; http:/frim.gov.my/iufro.html
- 15-21 August 2000. Forest Ecosystems- Ecology, Conservation and Sustainable Management. Chengdu, Sichuan, China, IUFRO 1.14.00. Contact: Dr. ShriZuomin & Ms Dong Na, Institute of Forest Ecology, Environment &Protection, Chinese Academy of Forestry, Wanshoushan, Beijing, 100091 China; Tel 86-10-6288 8308 or 6288 9513; Fax 86-10-6288 4972; Email shizm@fee.forestry.ac.cn
- 20-26 August 2000.XXI International Congress of Entomology. Lguacu Falls, Brazil. Contact: Dr.Decio Luiz Gassoni, PO Box 231, 86001-970 Londrina -PR Brazil; Fax: 55-43-371 6100; Email iceweb@cnpso.embrapa.br;www.embrapa.br/ice
- 20-22 September 2000. New Approaches to the Management of Neotropical primary Rainforests by Industries and Communities. Belem, Brazil. IUFRO 1.07.05. Contact: Dr..Natalino Silva; Brazilian Agricultural Research Corp, CP 48, CEP 66240 Belem, Para, Brazil; Fax : 55-91-2269845;Email natalino@cpatu.embrapa.br
- Sep-Oct. 2000, Criteria and Indicators for Sustainable Forest Management joint Meeting of International Processes, Rome, Italy, Sep/Oct. Christel Palmberg-Lerche, Chief, Forest resources Development Service, FAO, Viale delle terme di Caracalla, 1-00100 Rome,Italy Email: Christel.Palmberg@fao.org
- October 2000.Harvesting of Non-wood Forest Products. Ismir, Turkey. Contact; DrR.Heinrich, Forest Harvesting, Trade and Marketing Branch. Forest Product Division FAO, Viale delle Terme di Caracallla 00 1 00 Rome, Italy; Fax 39-(06)6-5705 5137; Email rudolph.heinrich@fao.org.
- 8-13 October 2000. Forest Genetics for the Next Millennium. Durban, South Africa.JUFRO 2.08.01. Contact: Colin Dyer, IUFRO conference Organiser, PO Box 11636, Dorpspruit 3206, South Africa; Tel 27-331-425 779; Fax 27-331-944 842; Email iufro@icfr.unp.ac.za
- 25-28 October 2000. Enviro Latin America 2000. Sao paulo, Brasil. Contact: BIOSFERA, Av presidente Vargas, 435 Gr.1104/110 Centro, 20077-900 Rio De janeiro, Brazil; Tel 55-21-221 0155;Fax 55-21-262 5946; Email biosfera@biosfera.com.br; http://www.biosfera.com. br/port/envirol.htm
- 8-13 November 2000. Annual conference of the Forest Stewardship Council. Oaxaca, Mexico, Contact: FSC Secretariat, Avenida Hidalgo 502.68000 Oaxaca, Mexico; Tel 52-951-46905/63244; Fax 52-951-62110; Email fscox@fscoax.org
- 13-24 November 2000 . 6th Conference of the parties to the Framework Convention on Climate Change. Amsterdam, Netherlands.
- 10-13 December 2000. 5th Pacific Rim Bio-based Composites Symposium. Canberra, Australia, Contact: [hilip Evans, Department of Forestry, Australian National University, Canberra ACT0200 Australia; Tel 61-2-6249 3628; Fax 61-2-6249 0746; Email Bio.symposium@anu.edu.au; http://online.anu.edu.au/Forestry/wood/bio/bio.html
- 18-21 March 2001. 4th South East Asian Countries Non.Timber Forest Product Network (SEANN) Workshop. Manila, Philippines. Contact: Dr. Ramon A. Razal, training Centre for tropical Resources and Ecosystems Sustainability, College of Forestry and Natural Resources, UP Los Banos, College, laguna, Philippines; Tel 63-49-5362268;Fax 63-49-536 3340; Email trees@laguna.net
- 18-25 April 2001. Fremantle, Australia. 16th Commonwealth Forestry Conference. Contact; Libby jones, UK Forestry Commission, 231 Corstorphine Road, Edinburgh EH 12 7 AT, UK; Tel 44 (0)-131-314 6137; Fax44-(0)-131-334 0442; Email libby.jones@forestry.gov.uk
- June 2001.FAO/ECE/ILO Workshop on New Developments of Wood Harvesting with Cable Systems. Austria. Contact: R.Heinrich, Forest Harvesting, Trade and Marketing Branch, Forest products Division FAO, Viale delle Terme di Caracalla, 00100 Rome, Italy; Fax 39-06-57055137; Email Forest Harvesting@FAO.org
- 9-14 September 2001. 5th International Flora Malesiana symposium. Sydney, Australia. Contact: Dr. Barry Coon, Royal Botanic Gardens Sydney, Mrs. Macquries Road, Sydney NSW 2000, Australia;