Evergreen

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Dr. K.S.S. Nair leaves KFRI

Dr. K.Sadasivan Nair, who served the Kerala Forest Research Institute for 23 years and 6 months superannuated as Director of KFRI on the eve of its Silver Jubilee Year on 3 July 1999. Joining KFRI in December 1975 as a CSIR Pool Scientific Officer, Dr. Nair continued to serve the Institute as Scientist-in-Charge of the Entomology Division from November 1976 to December 1994. He was appointed Director of KFRI in January 1995, a position in which he served the Institute till his superannuation.

A graduate from the Kerala University, Dr. Nair took his Masters and Doctoral degrees in Zoology from the MS University of Baroda. He taught as a lecturer in the same University for more than five years till he became a Professional Associate in Entomology at the University of Guelph, Canada. During the five year period at Guelph, Dr. Nair did substantial research on cabbage maggot. He made a major change in his professional carreer when he started working on Forest Entomology at KFRI. Dr. Nair, an internationally reputed forest entomologist, is well-known for his work on the biocontrol of the teak defoliator, *Hyblaea puera*. He has also done several other studies on pest population dynamics and management methods for several forest plantations pests. He has been holding several important positions in the IUFRO and in the Editorial Boards of several scientific journals. He has a large number of publications to his credit.

With Dr. Nair's superannuation, KFRI has lost an eminent scientist and a shrewd research administrator. However, the good tradition of promoting high quality research set by him will continue to remain with KFRI.

Editor

Dr. J.K. Sharma is the new Director

Dr. Jyoti Kumar Sharma took over charge as Director of KFRI on 3 July 1999. Dr. Sharma, a doctoral degree holder from Agra University, taught as a lecturer at Agra College for about eight years. Later, he spent several years doing post-doctoral research in Forest Pathology at the Australian National University (ANU), Canberra. He joined the KFRI in 1978 as a Scientist in-Charge, Plant Pathology Division. In 1996 he was appointed as Research Cordinator in the Institute in which capacity he continued till he took up position as the Director.

Dr. Sharma has been occupying several scientific positions in India and abroad. He is presently the IUFRO Working Party Coordinator on Diseases of Tropical Plantations. He is an Expert Member of the Steering Committee on Integrated Nutrient Management, Department of Biotechnology, New Delhi. He was an FAO Consultant in Vietnam to advice the Vietnamese Government on disease problems in eucalypt plantations. He has served as an Expert Member to frame guidelines for the safe movement of eucalypt and pine germplasms organised by FAO/ IPGRI. Dr. Sharma has a large number of research publications to his credit. His work on fungal diseases in eucalypts has earned him international reputation.

Dr. Sharma has a difficult task ahead of him, especially because of the financial constraints faced by the Institute. However, let us hope that his friendly attitude and commitment to good quality research will help him to take KFRI to newer heights.

Editor

FAREWELL, KFRI

Greetings to my erstwhile colleagues and coworkers on the occasion of initiation of the Silver Jubilee Celebrations of KFRI. I am glad to know that arrangements are in full swing for year-round programmes and to organise an International Symposium.

While KFRI prepares to address the Challenges to Tropical Forestry Research in the New Millennium, in the International Symposium scheduled for August 2000, let me take this opportunity to share my thoughts with you on the challenges to KFRI in the years ahead.

I see three major challenges to KFRI. One is to continue the tradition and strengthen the interdisciplinary/inter-Divisional cooperation within KFRI to address practical forestry problems. I venture to predict that within the next couple of decades, the traditional boundaries between disciplines will disappear. There is increasing realization that the complex organisation and functioning of nature can be understood only through an interdisciplinary approach although we often behave as if nature is organized discipline-wise, in the same way as KFRI Divisions are! Science has now reached such an advanced stage that radical new insights can come only through an integrated approach in which specialists from various disciplines cooperate. Therefore, the major challenge to KFRI scientists in the years ahead is to find ways of working together in interdisciplinary teams, transcending the discipline boundaries and our egos. One of the unique strengths of KFRI has been this interdisciplinarity, nurtured from the very beginning by the interaction among all the scientists in the monthly review meetings of the Internal Research Council. It is a real challenge to promote specialization and to work together and think together in teams, in order to gain an integrated view. To accomplish this, individual interest must be compromised with institutional interests and objectives. This calls for a spirit of sacrifice. Think of what would have happened to India, if each our soldiers in the Kargil border had pursued his own narrow personal interest. That kind of commitment and comradeship is necessary for institutional success. Admittedly, there are many imperfections in KFRI. To argue that I would have done better, had the working environment been more conducive, is foolish and self-defeating. While we must strive to improve the environment, recognize that an ideal world exists only in imagination. A well motivated person jumps into the available world and acts, and in that process, changes the very environment around him favourably. I wish this attitude and enthusiasm to every one in KFRI on the occasion of the Silver Jubilee. In fact, all of us live in two worlds - a world which we see, which has objects, people, etc., and an unseen world of our own making-our little world of thoughts. This little world of our making, our emotions, our attitude, our imagination, our hopes and aspirations, our fears, our envies, our knowledge, all these have an important influence on our actions. It is this world that we can modify readily.

The second challenge to KFRI is to strike a balance between applied and fundamental science, in the research agenda. While thrust of KFRI's research must be to produce results that can be applied to practice by foresters, farmers and industries, we should be careful not to fall into the trap of doing only adaptive research and development of technology, for which there is great need and demand. Because of the need to solve day-to-day problems, practicing foresters cannot be expected to be supportive or even sympathetic to basic research, the usefulness of which is not always obvious, but as a research institution, KFRI cannot afford to do only applied research; we must try to maintain a judicious mix of basic and applied research because it is today's science that leads to tomorrow's technology. It is easy to argue that most of the basic scientific knowledge is already available or will be generated

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elsewhere, and therefore KFRI must concentrate on converting the available knowledge into usable technologies. This will be disastrous because it is the spirit of adventure into the unknown, a quest for new knowledge, that motivates good scientists and keep them going. Recent advances in molecular biology, human genetics, animal behaviour, etc., show that there are still vast areas of ignorance in biological sciences. Similarly, we have scarcely scratched the surface of wood as a material and unleashed its potential. Unfortunately, for various reasons, our own scientists seek to take up a lot of routine research, often called "stamp collecting", in the name of basic research. This is where research management has to play a difficult but crucial role to ensure that the tasks taken up by each scientist is commensurate with his/her capabilities and institutional interest. Also, we should not shy away from collaborating with agencies outside KFRI where needed.

The third challenge is to attract sufficient funding while ensuring the institute's intellectual independence. From time to time, some ruling politicians have asked, why should the Government support an institution if it does not provide support to Government policies? Should they get our money and speak against our views? This is strange logic! It is against the spirit of Science Policy Resolution of the Government itself. On any controversial issue, the role of a research organisation is to bring out the relevant facts, interpret them and explain their implications, so that informed decisions can be taken by the policy makers and Government. It is not necessary for scientific institutions to fall in line with views of the Government. I shall not elaborate further on these issues, but urge KFRI to maintain its intellectual honesty and autonomy at any cost. Institutions of excellence are created and nurtured not by Government grants but by individuals of excellence, enthusiasm and integrity.

KFRI is a great place to be. Unfortunately, many in KFRI will realize this only when they get out of it. It has unique strengths and opportunities. I hope policies at the institutional and Governmental levels will promote individual excellence while maintaining institutional discipline and not try to make every one equal and mediocre in the name of equality and service to society. As I said earlier, the first step must be taken by the scientist themselves, by developing the right attitude by introspection and reflection. Let KFRI climb to greater heights of success as an Institution of Excellence in Tropical Forestry Research and meet the expectations of the people, not only in Kerala but also of other part of the country and the world.

I convey my best wishes and personal regards to all of you at KFRI, on this occasion.

K.S.S. Nair

NEW TAXA REPORTED BY KFRI

Compiled by:
C. Renuka,
Botany Division

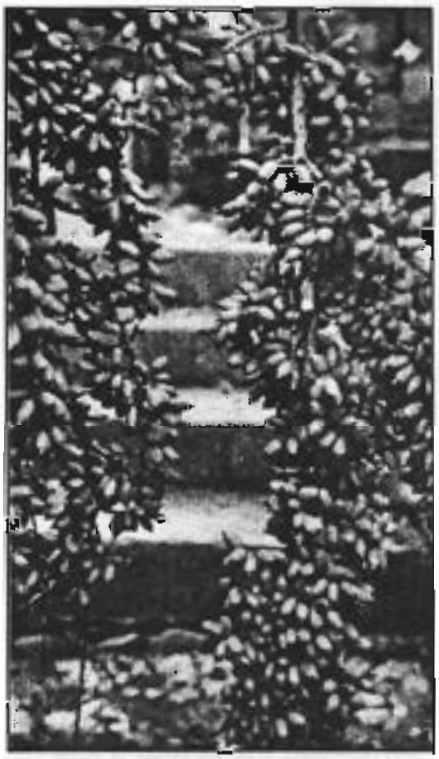
The aim of classical taxonomy is to explore and unravel the diversity of organisms. Organic diversity cannot be effectively understood and documented without reference to the external appearance of the organisms. But recent years have witnessed significant decline in the number of taxonomic experts and in taxonomic research.

The success of any applied research depends on the availability of fundamental knowledge. Realising the importance of taxonomy in all the management activities, Kerala Forest Research Institute undertook several taxonomic studies both in plants and animals. All these studies have brought to light several new taxa and new records. Information about all the new species reported based on these studies are compiled here.

Under each category families are arranged in alphabetical order. Names of taxa under family are also arranged alphabetically. Additional information such as the locality from where the taxa were reported and the reference number of the related publication are also provided.

Angiosperms

S.No.	Name of the plant	Family	Ref. No.	Locality
1.	*Orophea malabarica* Sasi. & Sivar.	Annonaceae	27	Peechi, Thrissur Dt.
2.	*Orophea sivarajanii* Sasi.	"	24	Peechi, Thrissur Dt.
3	*Polyalthia shendurunii* Basha & Sasi.	"	1	Shendurunі, Kollam Dt.
4.	*Calamus baratangensis* Renuka & Vijayakumaran	Arecaceae	15	Baratang, Andamans
5.	*C. basui* Renuka & Vijayakumaran	"	16	Little Andamans
6.	*C. dransfieldii* Renuka	"	10	Dhoni hills, Palakkad Dt.
7.	*C. karnatakensis* Renuka & Lakshmana	"	13	Agumbe, Shimoga Dt. Thalakkaveri, Coorg Dt.
8.	*C. lacciferus* Lakshmana & Renuka	"	4	Agumbe, Shimoga Dt., Koppa, Chikkamangalore Dt.
9.	*C. lakshmanae* Renuka	"	12	Makkut, Coorg Dt., Honaver, Shimoga Dt.
10.	*C. neelagiricus* Renuka	"	14	Silent Valley, Palakkad Dt.
11.	*C. prasinus* Lakshmana & Renuka	"	4	Mangalore, South Canara Dt., Sampaje, Coorg Dt.
12.	*C. semierectus* Renuka & Vijayakumaran	"	16	Car Nicobar
13.	*C. stoloniferus* Renuka	"	12	Makkut, Coorg Dt.
14.	*C. vattayila* Renuka	"	11	Moozhiyar, Pathanamthitta Dt.
15.	*Daemonorops aureus* Renuka & Vijayakumaran	"	16	South Andamans
16.	*D. rarispinosus* Renuka & Vijayakumaran	"	16	Little Andamans
17	*D. wrightmyoensis* Renuka	"	16	South Andamans
18.	*Thottea dinghoui* Swarup.	Aristolochiaceae	39	Moozhiyar, Pathanamthitta Dt.



A fruiting bunch of Calamus vattayila

A fruiting twig of Aglaia malabarica

19.	*Ceropegia huberii* Swarup.	Asclepiadaceae	40	
20.	*Heterostemma vasudevanii* Swarup.& Mangaly	„	42	Sabarimala, Idukki Dt.
21.	*Tylophora tetrapetala* var. *tenuissima* Swarup. & Nicol.	„	41	Palakkad Dt., Wayanad Dt. Thiruvananthapuram Dt.
22.	*Impatiens sivarajanii* Muktesh & Stephen	Balsaminaceae	7	Silent Valley, Palakkad Dt.
23.	*Cassine kedarnathii* Sasi & Swarup.	Celastraceae	29	Silentvalley Palakkad Dt.
24.	*Fimbristylis hyalina* Govind. & Sasi.	Cyperaceae	3	Peechi, Thrissur Dt.
25.	*Fimbristylis perspicua* Govind. & Sasi.	"	3	Athirapally, Thrissur Dt.
26.	*Aglaia malabarica* Sasi.	Meliaceae	22	Peechi, Thrissur Dt.
27.	*Ardisia stonei* Sasi. & Sivar.	Myrsinaceae	28	Shenduruny, Kollam Dt., Peechi, Trhissur Dt.
28.	*Habenaria periyarensis* Sasi., Rajesh & Jomy	Orchidaceae	31	Thekkady, Idukki Dt.
29.	*Oberonia longifolia* Muktesh & Stephen	"	8	Silent Valley, Palakkad Dt.
30.	*Oberonia pakshipathalensis* Muktesh & Stephen	"	8	Wayanad Dt.
31.	*Ochlandra soderstromiana* Muketesh & Stephen	Poaccae	9	Pacchakkaram, Idukki Dt.
32.	*Ochlandra spirostylis* Muktesh, Seetha. & Stephen	"	9	Adimali, Idukki Dist
33.	*Tarenna trichurensis* Sasi. & Sivar.	Rubiaceae	26	Peechi, Vellanimala Thrissur Dt.
34.	*Palaquium ravii* Sasi. & Vink	Sapotaceae	30	Peechi, Thrissur Dt.
35.	*Curcuma peethapushpa* Sasi. & Sivar.	Zingiberaceae	25	Peechi, Thrissur Dt.

Fishes

1.	*Garra surendranathinii* Arun, Shaji & Easa	Cyprinidae	33	Chalakudy river, Periyar, Pamba river
2.	*Homaloptera menonii* Shaji & Easa	Homalopteridae	32	Indekkuthodu, Siruvani, Palakkad Dt.

Insects

1.	*Aleurolobus gmelinae* David, Jesudasan & Mathew	Aleurodidae, Homoptera	2	Peechi

A fruiting bunch of Calamus neelagiricus

A fruiting twig of Tarenna trichurensis

2.	*Sympiesis hyblaeae* Surekha	Eulophidae	Homoptera	36	Nilambur Malappuram Dt.
3.	*Gastrosericus menonii* Sundheendrakumar & Narendran	Sphecidae	Hymenoptera	35	Nilambur Malappuram Dt.
4.	*Larra vechti* Sudheendrakumar & Narendran	;;	;;	35	Nilambur Malappuram Dt.
5.	*Polemistus raoi* Sudheendrakumar & Narendran	;;	;;	35	Thannur Malappuram Dt.

Fungi

1.	*Ascochyta dendrocalami* Mohan	5
2.	*Bipolaris bambusae* Mohan	5
3.	*Coccodiella ochlandrae* Mohan	5
4.	*Compsosporiella deightonii* Sankaran & Sutton	17
5.	*Cryptosporiopsis eucalypti* Sankaran & Sutton	22
6.	*Cytospora eucalypti* Sharma, Mohan & Florence	34
7.	*Dactylaria bambusina* Mohan	5
8.	*Griphosphaeria gmelinae* Sharma, Mohan & Florence	34
9.	*Meliola ailanthii* Sharma, Mohan & Florence	34
10.	*Myriellina imperatae* Sankaran & Sutton	18
11.	*Pestalozziella bambusae* Mohan	5
12.	*Petrakomyces bambusae* Mohan	5
13.	*Phloeospora aethiopica* Sankaran & Sutton	19
14.	*Phomopsis bambusae* Mohan	5
15.	*Phomopsis gmelinae* Sankaran, Florence & Sharma	21
16.	*Phomopsis ichnocarpi* Yesodharan & Sharma	43
17.	*Phomopsis leucaenae* Mohan & Sharma	6
18.	*Phomopsis micheliae* Sankaran, Florence & Sharma	21
19.	*Phomopsis variosporum* Sharma, Mohan & Florence	34
20.	*Physalospora dalbergiae* Sharma, Mohan & Florence	34
21.	*Pseudocercosporella tetradeniae* Sankaran & Sutton	20
22.	*Pseudocercospora elaeocarpi* Sutton & Sankaran	37
23.	*Pseudoepicoccum tectonae* Sharma, Mohan & Florence	34
24.	*Rosenscheldiella ochlandrae* Mohan	5
25.	*Selenophoma elaeocarpi* Sutton & Sankaran	38
26.	*Septoria phyllastachydis* Mohan	5
27.	*Stagonospora bambusae* Mohan	5
28.	*Valsa eucalypti* Sharma, Mohan & Florence	34

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ERRATA

Note: In No.42 issue of the *Evergreen,* the table included in the article "Forest trees for homesteads" was mutilated during the processing of the text. Hence the full table is given in this issue. The inconvenience caused to the readers is regretted.

List of trees suggested for Kerala homesteads, their growth characteristics and end uses

Sl.No.	Species	Indigenous (I)/Exotic (E)	Rate of growth (S,M,F) S=Slow M=Moderate F=Fast	Uses										
				Timber	Fire-wood	Fruits	Fodder	Green manure	Pepper stand	Matchwood	Medicine	Poles	Fencing	Ornamental
1.	*Adina cordifolia*	I	F	*					*					
2.	*Aegle marmelos*	I	S								*			
3.	*Ailanthus triphysa*	I	F						*	*	*			
4.	*Albizia lebbeck*	I	F	*										
5.	*Artocarpus heterophyllus*	I	M	*	*	*	*							
6.	*Artocarpus hirsutus*	I	M	*	*	*			*					
7.	*Azadirachta indica*	I	S	*						*				
8.	*Bambusa arundinacea*	I	F		*							*	*	
9.	*Bambusa balcoa*	I	F		*							*	*	
10.	*Bambusa vulgaris*	I	F		*							*	*	*
11.	*Bombax ceiba*	I	F							*				
12.	*Cassia fistula*	I	M											*
13.	*Casuarina equisetifolia*	E	F		*							*		
14.	*Dalbergia latifolia*	I	S	*										
15.	*Emblica officinalis*	I	S	*	*	*					*			
16.	*Erythrina indica*	I	F							*	*			
17.	*Garcinia gummi-gutta*	I	S			*								
18.	*Gliricidia sepium*	E	F		*			*						
19.	*Gmelina arborea*	I	F	*					*		*			
20.	*Leucaena leucocephala*	E	F		*		*	*		*				
21.	*Macaranga peltata*	I	F					*			*			
22.	*Mangifera indica*	I	M	*	*	*								
23.	*Muntingia calabura*	E	F			*								*
24.	*Spondias pinnata*	I	F			*		*						
25.	*Syzygium cumini*	I	M	*	*	*		*						
26.	*Tamarindus indica*	E	S		*	*								
27.	*Tectona grandis*	I	M	*					*			*		
28	*Terminalia catappa*	E	M			*								*
29.	*Thespesia populnea*	I	M	*	*			*						*
30.	*Wrightia tinctoria*	I	S		*			*			*			

Teak from High Input Plantations- Ring-porous or Diffuse-porous Timber?

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Teak (*Tectona grandis* L.f.) is one of the few Indian timbers that displays a typical ring-porous character with a definite band of large earlywood pores (vessels) and small latewood pores. This condition is clear on the cross section of the log where transversely cut vessels appear as pores which form a sort of conspicuous ring or belt at the beginning of the growth ring (Fig.1). Majority of our timber species produce diffuse-porous wood where pores are more or less of the same size throughout the growth ring (or annual increment layer of wood tissue). Although ring-porous and diffuse porous conditions of the timber appear to be genetic characters of the species, they do vary with environmental conditions. With heartwood colour and black lines of extractives as well as the pattern of growth ring marks that are displayed depending on plane of cutting, these structural differences make teak wood more uneven in texture to exhibit beautiful figure which determines the quality and high price of the timber.

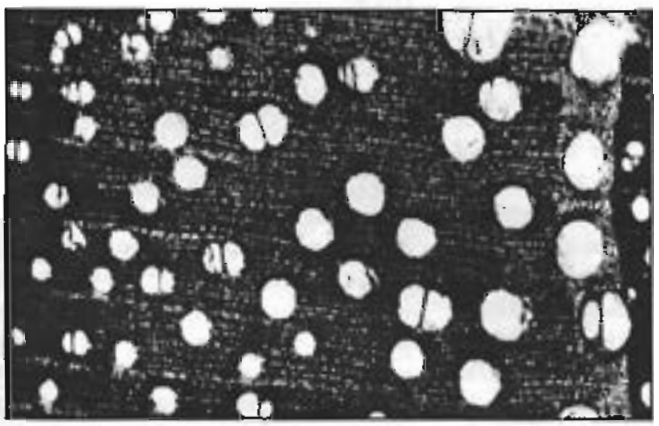

Fig. 1 Crossection of teak wood showing ring porous condition with large earlywood pores and small latewood pores.

In one of our recent investigations, the wood of 5-year-old teak grown in a high input plantation, with fertilizer treatment and irrigation, tended to be diffuse-porous in the first three years' growth (Fig. 2). There was little distinction between earlywood and latewood making demarcation between successive growth rings difficult. From the fourth year onwards, ring-porosity condition was resumed. The fast grown juvenile teak in the early period of life thus showed a sharp contrast in grain and texture to the teak wood of traditional forest plantation. This difference is possibly due to the continuous availability of water that might cause more or less uninterrupted growth (cambial activity) producing pores of essentially uniform size throughout the year, with scarcely any dormant period of growth. The effect of irrigation seems to get reduced with increasing age as very young trees are more responsive to environmental changes than mature trees.

In conclusion, undoubtedly, wood figure(colour/grain/texture) of fast grown tree is likely to be slightly different from that of teak grown in traditional plantations and natural conditions. However, timber market will be stabilized in future as the wood users will be aware of this difference, as noticed in the teak grown in different geographic locations, and learn to manufacture value-added wood products from fast grown plantations that will be the main source of timber supply in the new millennium.

Fig. 2 Cross-cut discs from teak showing diffuse porous wood (right) in contrast to the traditional ring porous wood (left)

Kole lands of Thrissur: A threatened wetland ecosystem

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Wetlands are perhaps one of the most threatened ecosystems of the world. Wetlands such as marshes, swamps, ponds and sloughs are unique environment. These are extremely important areas throughout the world for wildlife protection, recreation, pollution control, sediment control and flood prevention. They play an important role in the socio-economic stability of local communities. They function as important source of fresh water for drinking and irrigation. Food resources provided by wetlands are many, ranging from fish and shell fish to edible plants. Water birds are an important component of wetland ecosystem and they occupy several trophic levels in the food web of wetland nutrient cycles. Water birds are broadly defined as "birds ecologically dependent on wetland" and include recognized groups popularly known as wildfowl, waterfowl, shore birds and waders.

In the Asia-Pacific region, 243 species by virtue of their nature, undertake annual migration between their breeding areas and non-breeding grounds, along different flyways. Wetlands in Kerala come under Central Asian-Indian fly-way. During their annual migrations, water birds halt at sites for very short periods to rest and feed; "stepping stones" that are essential for their survival. Thrissur Kole lands are such areas with international importance. Conservation of migratory water birds is the collective responsibility of all countries coming in the fly ways.

Kole wetlands cover an area of 11,000 ha area spread over Thrissur and Malapuram Districts, extending from the northern banks of Chalakudy river in the south to the southern bank of Bharathapuzha river in the North. The area lies between 10° 20' and 10° 40' N latitudes and 75° 58' and 76° 11' E longitudes. The name Kole refers to the peculiar type of paddy cultivation carried out from December to May. Only one crop is cultivated during the summer, rest of the season the entire area is submerged. "Kole" is a malayalam word, indicating bumper yield or high returns in case floods did not damage the crop.

Water birds flocking in the Kole lands of Thrissur

The Kole wetlands are low lying tracts located 0.5 to 1m below mean sea level. These lands were formerly shallow lagoons which gradually got silted up. The flood water in Kole areas are mainly brought by two rivers. Kecherry and Karuvannur which finally drain into the sea. Kole wetland is divided into many blocks. They are Adat, Aranattukara, Enamavu, Manakkodi, Mullurkayal, Palakkal, Pudukad and Punnayurkulam. Paddy is cultivated there during the months of October to April, after draining the water. During the monsoon season, *i.e.,* from June to September, the whole area is inundated.

Birds

A total of 184 species of birds were recorded from this area including 37 species of migratory birds. In a census carried out in 1992, 23,605 birds were recorded including 50 species of water birds and four raptors. About 54,000 birds, including 48 species of wetland birds and four raptors were recorded during the census of 1993. Little egret *Egretta garzetta,* Cattle egret *Bubulcus ibis,* Pond heron *Ardeola grayii,* Little cormorant *Phalacrocorax niger* were the most abundant species found in Kole wetlands. Migratory species like Wood sandpiper *Tringa glareola,* Common sandpiper *Tringa hypoleucos,* Little stint *Calidris minuta,* Little ringed plover *Charadrius asisticus* and Whiskered tern *Chlidonias hybridus* also occur in good proportion.

The behaviour of migratory ducks in this region needs special mention. During the day time they avoid paddy field and take shelter in nearby reservoirs. At the time of sunset, they return to the paddy fields and are supposed to feed on sown paddy. As the ducks are considered to cause damage to the paddy cultivation, local people are reported to encourage poaching by the hunters. But during 1998-99 the presence of migratory ducks was nominal and no damage was

caused to paddy.

The birds not only play an important role in controlling the insect pests and other harmful organisms, but also increase the fertility status of the soil through their droppings. Insectivorous species like Drongos, Bee-eaters and Swallows are found in good numbers in this wetland ecosystem.

Conservation

Three major problems threaten the migratory birds coming to the Kole wetlands. They are fishing, hunting and pesticides. Fishing in these wetlands is a major activity of local people. This is usually done using nets of various mesh sizes. During this process they catch fishes of all size which is highly detrimental to the availability of food to the wetland birds. If the farmers can use nets of large mesh size, the small fry will be left out and the birds also will get sufficient food. Hunting of birds is another problem. Poachers use air gun or poison for catching birds. Hunting should be discouraged to save the migrating birds from extinction.

Another major threat is the fire created by the farmers and workers. The grass on the bunds are put on fire during the summer months. Indiscriminate fire destroys the nests and nestlings of Weaver birds, Tailor birds and Warblers. Another potential threat to the birds is the heavy and uncontrolled use of pesticides in the paddy fields. These pesticides will find a way into the birds and ultimately they may curtail the breeding efficiency as reported from other areas. The proposal to declare this wetland as one of the Ramsar Site in India, if materialised will save the migratory birds from indiscriminate poaching and the habitat also will be protected.

Studies needed on population of our endemic trees

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Organisms having a very narrow or restricted distribution are generally called "endemics". Broadly they are categorised into two types viz., 'Paleoendemics" or "old endemics" which had a wider distribution in the past but are now locally confined due to habitat shrinkage. As opposesd to this, "Neo endemics" are those which are in the process of evolution due to genetic aberrations like, mutations and are likely to expand their habitats. While most of the arborescent species belong to the former category, the herbaceous annuals fall under the latter. In general, the greater the natural barrier, more are the chances for a higher percentage of endemism. Thus, areas like, Hawaii has 92% of endemic flora, Madagascar 62%, New Zeland 72%, Sri Lanka 30% etc.

As far as India is concerned pioneer work on endemism was that of Chatterjee (1939) who reported the 61% of the flora of the erswhile British India as endemics and he had also reported 133 endemic dicotyledonous genera. Rao (1972) reevaluated Chatterjee's list and uplifted the figure to 164 genera. Blasco (1971) while working on the phytogeography of the Dicotyledonous flora of Madras Presidency reported 1,932 endemic taxa. Ahemedulla and Nayar (1986) reported 1,932 endemic taxa to Peninsular India including 974 arborescent taxa. Pascal (1988) furnished a detailed account of endemism in different evergreen forest types of Western Ghats at low (<800m) and medium elevation (<800-1200m). Remesh and Pascal (1997) after extensive field surveys and references to some of the leading herbaria provided a distributional map for 352 endemic tree species encountered in Western Ghats. According to all the above mentioned authors southern part of Kerala is a potential biologically, 'hot spot' for endemism.

Considering the importance of endemism in phytogeography and evolution the Kerala Forest Department during 1986 organised a National Seminar on "Endemic and Endangered Plants and Animals of Western Ghats" and brought out the proceedings in 1991. Taking cue of this Tamil Nadu Forest Department also organised a similar seminar on "Endemism in Eastern and Westsern Ghats". While all these publications, seminars, symposia etc. dealt with only a listing of endemics, no attempt has so far been made to evaluate or ascertain their population status. This is crucial because, if the endemics are encountered only as a few, isolated individuals scattered in different places then their chances of multiplication are seriously hampered and finally may even get obliterated.

A list of thirty endemic, arborescent taxa which are of very high commercial value but with a very narrow geographical range in the Western Ghats of Kerala, is furnished below.

1	Anacardiaceae	- *Gluta travancorica* Bedd.
2	Anacardiaceae	- *Semecarpus travancorica* Bedd.
3	Clusiaceae	- *Poeciloneuron indicum* Bedd.
4	Clusiaceae	- *Poeciloneuron pauciflorum* Bedd.
5	Combretaceae	- *Terminalia travancorensis* W.& A.

6	Dipterocarpaceae	- *Dipterocarpus bourdillonii* Brad.
7	Dipterocarpaceae	- *Hopea utilis* (Bedd.) *Bole*
8	Dipterocarpaceae	- *Vateria macrocarpa* B.L. Gupta
9	Euphorbiaceae	- *Drypetes confertiflora* (Hook.f) Pax.
10	Euphorbiaceae	- *Drypetes malabarica* (Bedd.) Airy Shaw
11	Euphorbiaceae	- *Drypetes travancorica* (Bourd.) Jain
12.	Euphorbiaceae	- *Drypetes venusta* (Wt.) Pax & Holff.
13.	Fabaceae	- *Cynometra travancorica* Bedd.
14.	Fabaceae	- *Dialium travancoricum* Bourd.
15.	Fabaceae	- *Kingiodendron pinnatum* (Roth.ex DC.) Harms
16.	Fabaceae	- *Ormosia travancorica* Bedd.
17.	Meliaceae	- *Dysoxylum malabaricum* Bedd. ex Heirn.
18.	Meliaceae	- *Dysoxylum ficiforme* (Wt.) Gamble
19.	Myristicaceae	- *Myristica malabarica* Lam.
20.	Myrtaceae	- *Syzygium beddomei* (Duthie) Chitra
21.	Myrtaceae	- *Syzygium bourdillonii* (Bedd.) Gamble.
22.	Myrtaceae	- *Syzygium malabaricum* Gamble
23.	Myrtaceae	- *Syzygium stocksii* (Duthie) Gamble
24.	Myrtaceae	- *Syzygium travancoricum* Gamble
25.	Olacaceae	- *Anacolosa densiflora* Bedd.
26.	Rhizophoraceae	- *Blepharistemma membranifolia* (Miq) Ding Hou
27.	Sapotaceae	- *Madhuca bourdillonii* (Gamble) H.J. Lam.
28.	Sapotaceae	- *Palaquium bourdillon* Brand.
29.	Sterculiaceae	- *Heritiera papilio* Bedd.
30.	Symplocaceae	- *Symplocos anamallayana* Bedd.

Unless the areas in which they occur are afforded strict protection, it may not be possible to preserve them for posterity. Also detailed studies should be undertaken to ascertain their population status as quite a few of them are already on the verge of "threatened" or "endangered" category.

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Fertiliser recommendation for teak and eucalypt plantations

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Soil Science Divisiom

Teak and eucalypts are the principal forest plantation species in Kerala. In the existing plantations, the yield varies from one place to another. The demand far exceeds production, whereas the productivity has declined considerably. In order to meet the demand, it is necessary either to bring large land area under these species or to make an all out effort to increase the productivity of existing plantations. The former alternative is less viable due to many socio-economic constraints, while the latter happens to be a more feasible option for future development of forestry in Kerala where land availability for expansion is limited.

Plantation forestry has until recently been practiced with traditional silivicultural practices. This has resulted in impoverishment of soil fertility and hence poor tree establishment and growth. Now, more than ever, the importance of an adequate supply of plant nutrients is being recognized to ensure efficient crop production. Judicious management of tree nutrition *inter alia* advanced planting techniques is an important tool not only to ensure increased production, but also for sustained productivity over a long period. It is in this context a general fertilizer recommendation for teak and eucalypt plantations is suggested.

From studies conducted at KFRI during the past few years, it has become possible to give some recommendations for fertiliser application in teak and eucalypts. Since the nutrient requirements and

the dosage are site specific, detailed site evaluation and precise soil analysis should be carried out before the fertilisers are applied.

Teak

A general recommendation for young teak plantations (one and two year old) having the following soil characteristics (Table 1) is given below.

Urea	65 g
Mussorie rock phosphate	150 g
Muriate of potash	58 g
Quick lime	42 g
Magnesium sulphate	149 g

Apply the above quantities in the first year and double the above dose in the second year, each year during south west (June-August) and north east monsoon (October-November) periods. Apply the fertilisers either before or towards the end of the high rainfall so that leaching of nutrients is minimised. Apply the fertilisers after two weeks of planting initially and then during north east monsoon period. Apply quick lime after two weeks of application of other fertilisers.

Method of application

Apply the fertilisers in a furrow 5-10 cm deep, 10 cm away around the plant and then fill the furrow with soil. Subsequent applications of fertilisers should be 5 cm away from the previous furrow around the plant. Thorough supervision is necessary at the time of application of fertilisers in the field.

Eucalypt

A general recommendation for eucalypt plantation having the following soil characteristics (Table 2) is given below.

Table 1

Soil depth (cm)	Soil Texture	pH	org. carbon	N	P	K	Ca	Mg
			%	ppm				
0-20	Sandy loam	5.7	0.91	840	2	18	42	30
20-40	Sandy loam	5.7	0.59	520	traces	14	20	2
40-60	Loamy sand	5.6	0.38	310	traces	12	5	9

Urea	65 g
Mussorie rock potash	150 g
Muriate of potash	25 g

Apply the above quantities in the first year and double the above dose in the second year, each year during south west (June-August) and north east monsoon (October-November) periods. Apply the fertilisers in the planting pit before planting and the subsequent ones either before or towards the end of the high rainfall so that leaching of nutrients is minimised.

Method of Application

Apply the fertilisers in the planting pit before planting the seedlings, thoroughly mix with the soil and the subsequent applications in a furrow 5-10 cm deep, 10 cm away around the plant and thoroughly mix with the soil and then fill the furrow with soil. Apply fertilisers in the second year 5 cm away from the previous furrow around the plant. Thorough supervision is necessary at the time of application of fertilisers in the field.

Further readings:

Balagopalan, M; Rugmini, P. and Chand Basha, S. 1998. Enhancement of productivity in eucalypts through fertilizer inputs and other cost effective treatments. KFRI Research Report 153. 50p.

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Table 2

Soil depth (cm)	Soil Texture	Properties				
		pH	org. carbon	N	P	K
			%	ppm		
0-20	Clay loam Sandy loam Loamy sand	5.4-6.2	1.35-3.40	900-2300	5-8	20-40
20-40	Loam, Loamy sand	5.6-6.2	0.81-1.72	600-900	3-4	11-21
40-60	Loam, Loamy sand	5.6-6.2	0.52-0.92	300-600	2-3	5-16

'JUNE DROP' IN TEAK IS CAUSED BY FUNGI

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E.J. Maria Florence and
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Teak *(Tectona grandis* L.f.) is a low fruiting species, with less than 1% of its total flower output forming mature fruits. Self incompatibility, absence and limitation of insect mediated cross pollination and limited resource allocation for fruit maturation are reported as the main causes for this low fruiting percentage. The 'fall off' of maturing fruits is technically the 'JUNE DROP'. The various aspects of the dynamics of reproduction and more specifically constraints in fruit setting in teak are being carried out at KFRI, under a Kerala Forest Department sponsored research project entitled 'Pollination Ecology of Teak in Kerala'.

During the initial phase of flowering, a large number of flowers fall off irrespective of whether they have been pollinated or not- a character shared by other tropical plantation crops such as mango and cashew. In teak trees, besides flower fall off fruit fall also occur. This fall of seeds may even be a selective abortion or an adaptive selection of female fitness. But this phenomenon of falling of fruits from our practical point of view, impair the plantation activities. In fact the fruit loss or fruit fall which occur later during the stage of fruit development and ripening has become a threat to raising new teak nurseries due to low output of healthy teak fruits. To put up a statistical analogy: loss of single fruit in later stages of development equals loss worth 100 potential fruit setting flowers in the initial phase.

TABLE 1. *Fungal infection of teak fruits recorded at various teak growing areas in Kerala*

DATE OF OBERVATION	LOCATION	INFECTION OF FRUITS (%)
31 July 1999	Karuvannur (Thrissur)	22
"	Olarikkara (Thrissur)	49
12 August 1999	Trichur	36
"	Mannuthy (Thrissur)	11
"	Thottapady (Thrissur)	11
19 August 1999	Irinjalakuda (Thrissur)	48
01 September 1999	Wadakanchery (Thrissur)	87
06 September 1999	Shornur (Palakkad)	52
"	Pandikkad (Malappuram)	73
"	Nilambur (Malappuram)	90
07 September 1999	Mannarkad (Palakkad)	65
"	Kuzhalmannam (Palakkad)	9
"	Alathur (Palakkad)	3
28 September 1999	Mullumala (Kollam)	98
"	Achenkovil (Kollam)	98
"	Arynkavu (Kollam)	42
"	Naduvathumoozhy, Konni (Pathanamthitta)	97

Data generated from standing and fallen fruits of teak from various localities in Kerala viz. Southern, Central and Northern Forest Circles, revealed the incidence of two fungi, *Phomopis sp.*, and *Collitotrichum sp.* causing fruit rot responsible for fruit fall. The percentage of fruits affected in various locations is given in Table 1. Among the two fungal pathogens, *Phomopis sp.* was noticed at all localities. Rotting of fruits appeared in small patches, usually limited to fruit calyx, extending later into the fruit stalk and mesocarp. Damage and decay were also noted in some areas on the mesocarp of the fruit. Fungal infection which begins from early stages of the fruit setting was also observed on the stalk of the inflorescence which resulted in the total wilting or drying of the inflorescence.

Interview

Dr Robert J. Clements (RJC), Director, Australian Centre for International Agricultural Research (ACIAR) visited KFRI from 20 to 21 January 2000. The main purpose of his trip was to visit the project sites of the KFRI-CSIRO collaborated project on eucalypts funded by ACIAR. During his visit he was interviewed by Dr Jose Kallarackal (JK) and Dr K.V. Sankaran (KVS). Excerpts from the interview:

JK: Dr. Clements, we are very pleased to have you at KFRI to visit our project sites and discuss with our scientists on the progress and constraints of the work we are doing in collaboration with the CSIRO, Australia. It is rare to see the top officials from donor organisations coming to visit experimental sites and discuss with scientists. Why is it different in ACIAR?

RJC: Thanks Jose. I consider it a great privilege to visit the project sites funded by our organisation and see directly what is happening in the projects than reading some reports about them. We are funding 16 projects in India and I have visited the sites of 10 out of them. It is important that officials of the donor organisation visit their project sites. Only then we can assure that the goals set by the organisation for giving funds are achieved.

KVS: What are the goals of ACIAR?

RJC: Our main goal is to alleviate poverty in developing countries. We hope to achieve this by scientifically planned agriculture development through research. We give importance to forestry also. Then we also advice the Australian Government on agriculture and forestry policy matters.

JK: Is ACIAR mainly a funding organisation? If so, what are your conditions for funding?

RJC: Yes, ACIAR's main job is to give funds for research in third world countries. The priority areas include agriculture, livestock development and forestry. The most important criterion for funding is that it should be a collaborative project with an Australian organisation such as CSIRO, universities, etc. The second condition is that both the countries should derive some benefits out of the project. We also encourage training for scientists from third world countries in Australia.

KVS: How much priority do you give to India in the matter of funding?

RJC: Presently, India gets priority No. 5 in the list of 30 countries where we fund 170 projects costing a total of approximately 35 million Australian dollars a year. The maximum priority is given to Vietnam and Indonesia. In India we are funding 16 projects, including the one you have in KFRI. This is the only project we fund in forestry in this country and this is also the most highly funded project we have in India.

JK: After visiting several projects in India what are your perceptions about the project we are handling in KFRI with CSIRO collaboration?

RJC: I must tell you that this is a well-planned and designed project. In the beginning we had much apprehension at the large number of experimental plots, approximately 450 if I remember correctly, to be maintained at four different sites. Now, I am very happy to note that KFRI scientists are efficiently looking after the sites. I also understand from CSIRO scientists that you are having an excellent interaction between the two organisations. This is exactly what we wanted to have when we decided to fund this project. It should lead to future collaborations between the two organisations.

JK: Dr Clements, what I really appreciated with the ACIAR funded project in KFRI is the time devoted in discussions at

the time of formulating the proposal. Although this took a lot of time, finally it resulted in a well planned project. Could you elaborate your procedure in approving a project for funding?

RJC: Thank you. Certainly in ACIAR we believe that a well-planned project only can deliver the goods for which it is funded. It is true that we take much more time than many other donor organisations to decide on the funding. When a proposal is received from an applicant, we send it to a number of referees who are internationally reputed in the subject. Based on their comments, we usually ask the applicants to modify several points. We also call them for a discussion, if needed. So finally a well-prepared document results even before starting the project. Our experience tells us that such a well-planned project proposal can rarely fail.

KVS: In your opinion, what should be the future of this project?

RJC: Well, we would like to see that the results that come out of this project will be useful in improving productivity of eucalypts in India and Australia. Personally, I feel that the experimental sites of this project should continue to be maintained and monitored even after the project period. This will help KFRI to do many more experiments in future.

KVS: Yes, we also recognise the value of the four sites set up for this project. We will try our best to continue maintain all the four sites in future.

JK: Dr Clements, after being in India several times on important assignments, what do you think should be the priority of research in forestry in India?

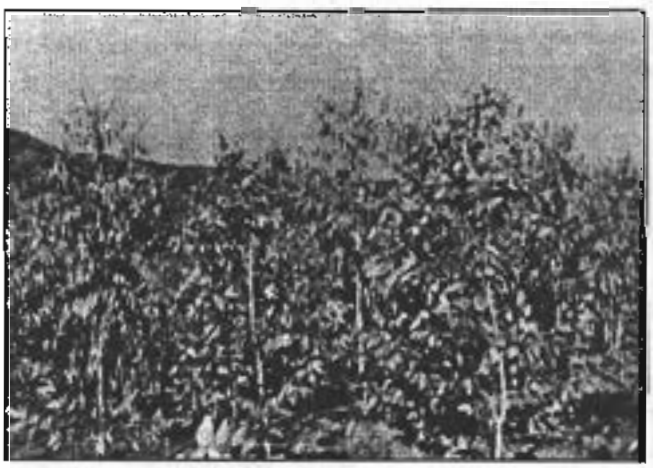
RJC: Well, being a country with lot of waste lands available, I feel production forestry should get the topmost priority. The environmental issues can come next.

JK: But do you know that Kerala has hardly any waste lands in its possession.

RJC: Doesn't that mean that you should strive to improve the productivity of the existing land available for plantations? Your present project is mainly aimed at that.

JK & KVS: Thanks Dr. Clements for sharing your views with us.

RJC: Thank you.



E. tereticornis plantation in the ACIAR funded project at Punnala in Kerala

E. grandis plantation in the ACIAR funded project at Suryanelli in Kerala

Research Highlights

Prototypes of Reed Cutting Tools

Is it not surprising to know that 30% of the reed is wasted during the harvesting of this raw material? This is because of the wastage resulting from the traditional methods of cutting reeds. The difficult task of developing an efficient tool for reed harvesting has been taken up by Dr. K.V. Bhat (Wood Science) and Dr. R.C. Pandalai (Silviculture). Their efforts have resulted in three different prototype tools. The tools appeared quite promising as the authors have claimed in their report (KFRI Research Report No.170). Funds for this research was provided by the Kerala Forest Department (Development Fund). Although there are drawbacks these prototypes may be the forerunners for further refinements in design of more efficient ones.

A prototype of the reed cutting tool developed in KFRI

Man-wildlife interaction in Wayanad

Protection of forests for the benefit of wildlife is necessary for many ecological reasons. However, the interest of human beings often comes into conflict, especially in a highly populated State such as Kerala. The Wayanad Wildlife Sanctuary with an area of 345 sq. km., located to the north-eastern part of Kerala is one such protected area with a number of human settlements within and at the periphery of the Sanctuary. The people include both tribals and non-tribals. Dr. P. S. Easa (Wildlife Division) and Dr. S. Sankar (Agroforestry Division) have reported (KFRI Research Report No.166) on a man-wildlife interaction study conducted in the Wayanad Wildlife Sanctuary with funding from the Ministry of Environment & Forests. Survey was conducted in 2174 households and also collected data collected on the wildlife population. Their main conclusion of the study is that a number of factors including food and water availability, higher seasonal density distribution of animals and management of forest areas in adjacent states contribute to the crop raiding problem in Wayanad.

Chinnar - a treasure house of medicinal plants

Chinnar Wildlife Sanctuary, one of the twelve Sanctuaries in Kerala, located along the rain shadow region of the Western Ghats, has 90.44 sq. km. area. Because of its unique topography, the flora of this Sanctuary is much different from other Sanctuaries in Kerala. Dr. N. Sasidharan (NWFP Division) who conducted a study on the flora of this Sanctuary has come out with a report (KFRI Research Report No. 167) enumerating 965 Angiosperm taxa. This represents 25% of the total number of species estimated from Kerala. The Sanctuary is a treasure house of medicinal plants with 335 species of angiosperms recorded as medicinal. However, the area is highly disturbed as indicated by the large number of families and genera with fewer number of species and low percentage of endemism. The high rate of establishment of exotic weeds also point to disturbance. The above project was sponsored by the Kerala Forest Department (Wildlife Wing).

A major trial in eucalypt plantations

A project was undertaken to study the effect of various silvicultural treatments and nutrients combinations on the growth and volume of eucalypts and to evaluate the nutrient partitioning in different parts of the plant. The trial was conducted in *Eucalyptus grandis* at Vallakadavu in an 80 ha area. Nine silvicultural experiments which included different pit size, spacing, skinning, and nutrients were tried. Growth measurements, relative treatment effectiveness (RTE) and relative economic effectiveness (REE) were followed in the above experiments. At the end of 36 months the nutrient accumulation in different parts was estimated.

It was found that there was significant difference in height of *E. grandis* trees due to various silvicultural treatments and nutrient combinations. Among the various silvicultural treatments, 3m X 3m spacing, 20cm X 20cm X 20cm pit

size and line skinned treatment were found to be the best in terms of volume, RTE and REE values. Among the different nutrient combinations, N2P2K1 i.e., applicatrion of 30g N, 30g P and 15g K/tree or 65 g Urea, 150g Mussorie rock phosphate and 29 g Muriate of Potash/tree for one application in the first year was found to be the best. This is equivalent to 72.438 Kg or Urea, 166.650 Kg of Mussorie rock phophate and 32.053 Kg of Muriate of potash/ha (for 2500 plants). The study on the nutrient accumulation at different parts of the trees revealed that the amount of nutrients in bolewood was two times of that in branches and one and a half times of that in leaves.

The multilocational trials showed that the best set of silvicultural treatments and nutrient combinations for *E. grandis* were equally matching for *E. tereticornis* at lower elevations. In the high density planting with 1m X 1m spacing, pressure on land, the establishment cost and the cost of fertilisers were very high. The RTE and REE values were considerably lower than those in wider spacings. The results of this study are published in KFRI Research Report No.153 by Dr M. Balagopalan (Soil Science Division) and P. Rugmini (Statistics Division).

Crop damage by wildlife

In a study conducted by Dr. E. A. Jayson (Wildlife Biology) on crop damage by wild animals, several interesting observations have been made. Thirty-one people were killed and sixty four injured by wild animals in Kerala during 1983 - 1993. Forty five crop species were found vulnerable to wildlife attack. The major among them were rice, coconut, banana, cassava and arecanut. The Kerala Forest Department compensated only 8.2% of claims made by farmers. Highest crop damages were reported from the Northern circle of the State. The project report (KFRI Research Report No. 169) gives details of 13 indigenous methods used to control crop damages. Short - term and long-term measures needed to prevent crop damage are also discussed in this study report funded by Kerala Forest Department (Wildlife Wing).

Fishes in the Periyar Lake

A study on the ecological structure and functional processes of fish assemblages in the 26 km^2 man-made Periyar lake and the 75 km long streams revealed 27 fish species of which half of them were endemic to Western Ghats. The fishes largely depend of food bases like aquatic and terrestrial insects and other benthic macroinvertebrates. Invasion of exotic fishes like *Oreochromis* and *Cyprinus* shows interspecific interaction between these exotic fishes and a few native fishes. The lake is subjected to fishing by the local community. The annual catch is estimated at 12 tonnes. The details of the study have been published in a report (KFRI Research Report No. 172) by Dr. L.K. Arun (Wildlife Biology). The project was funded by the Kerala Forest Department (Wildlife Wing).

Fluctuation in wildlife population

The density distribution of elephants in the Wayanad Wildlife Sanctuary is influenced by the food and water availability. About 35% to 70% of the total browse biomass was in the moist deciduous forests and plantations. The total area of the Sanctuary is 345 km^2, of which nearly 20% are plantations. The elephant density in this Sanctuary is more in the dry season because of the water availability here compared to adjacent locations. The sex ratio of the elephants in this location was male/female 1:3.5. The study also extended to sambar deer and spotted deer. Their population also fluctuates depending on the season. The crop damage caused by wild animals was also estimated. Elephants were responsible for most of the crop damage. The details of this study are published in a report (KFRI Research Report No. 173) by Dr P.S. Easa (Wildlife Biology). This project was funded by the Kerala Forest Department (Wildlife Wing).

Which is better among acacias?

It is common to see unhealthy plantations of several exotic species like eucalypts, acacias etc. One of the major reasons for this is the low genetic base which leads to inbreeding depression. A study was conducted in KFRI by Dr E.P. Indira (Genetics) to select the best species/ provenance of *Acacia* suited for Kerala. Four species, namely, *A. aulacocarpa, A. auriculiformis, A. crassicarpa,* and *A. mangium* were used for the trial. Regarding growth, *A. auriculiformis* excelled all other species. However, *A. mangium* had the least branching, which is a desirable character for a timber species. In *A. mangium,* the provenance 'Oriomo' was the best performer. The results of the trial are published in KFRI Research Report No. 171.

NEWS AND VIEWS

AusAID Training for KFRI and KFD Personnel

The Australian Agency for International Development (AusAID) in a programme implemented in India for capacity building (IATCBP), selected seven KFRI scientists and three KFD personnel for undergoing training in landscape ecology in Australia. The training was organised by Hawthorn International Education Ltd., which is the consultancy wing of Melbourne University. The training was organised at the Melbourne School of Forestry at Creswick, Victoria, Australia in four streams: ecology (Dr U.M. Chandrashekara and Dr N.C. Induchoodan); biodiversity (Dr George Mathew and Dr K.K. Ramachandran); GIS (Dr P. V. Nair) and socio-economics (Dr M. Chundamannil, Dr V. Anitha, Mr. Trivedi Babu, IFS Miss Prakriti Srivastava, IFS and Mr. M.L. Thomas). These four streams were further integrated into landscape ecology concepts and joint courses were offered for the trainees. The entire course lasted for five weeks which included field trips. Professor Ian Ferguson, Head, School of Forestry, Melbourne University was the Course Leader and Ms. Karen Medica, Hawthorn International Education Ltd. was the Manager.

KFRI Scientists during a field trip in Australia as part of AusAID training

Biodiversity Education Training

A training programme was organised with the intention of introducing various aspects of biodiversity including methods of measuring and monitoring to the biology teachers and post-graduate students of colleges in Kerala. The Programme was conducted in five batches and a total of 103 teachers and students participated. Each batch had five days training during April-May 1999. Twenty resource persons including scientists from KFRI, University faculty and law experts handled the classes and demonstrations. The programme was funded by the State Committee on Science, Technology and Environment (STEC). The Programme was coordinated by Dr. P.S.Easa (Wildlife Biology Division).

World Environment Day Celebrated

The World Environment Day was celebrated on 5 June 1999 at KFRI with a meeting organised in the auditorium. This was presided by Mr. Alex Knox, Second Secretary, Australian High Commission, New Delhi. Mr. Knox in his presidential address called for more efforts from scientific community for a pollution free environment and protection of the forests for the future generations. Dr K.S.S. Nair, Director also spoke on the occasion.

Mr. Alex Knox, Second Secretary, Australian High Commission addressing the gathering of the World Environment Day celebrations at KFRI

University Teachers and Students Undergo Biodiversity Training

Under a programme sponsored by the State Committee on Science Technology and Environment, KFRI has organised training in Biodiversity for four batches of university teachers and another batch for university students of Kerala. The training course included biodiversity inventory, monitoring and an ecosystem approach to understanding biodiversity. The duration of the course was one week. This programme helped many teachers and students to spend at least part of their summer vacation in a very creative way.

Trainees visiting the field during Biodiversity training in KFRI

Many teachers opined that the training would help them in improvement of their biology teaching and also help them in guiding the research projects undertaken by their students. Dr P.S. Easa was the Course Leader and several scientists from KFRI and outside gave classes and demonstrations.

Massive Participation in Tree Planting

In a demonstration project funded by the Kerala State Planning and Economic Affairs (WGC) Dept., a massive tree planting campaign was organised on June 1999 at Vellimuttom, Nilambur Forest Division. Five hundred local people, including women and children participated in tree planting which was inaugurated by Mr. Job, the Panchayat President. Dr N.C. Induchoodan took leadership in organising this function with the help of other KFRI and KFD personnel. It was estimated that nearly 15,000 seedlings of different tree species were planted by the people during a three-hour exercise. The above project is being undertaken by KFRI as a part of the AusAID training programme. Hence the planning of this project was done in India and Australia with expertise from Australian forestry scientists. The objective is to rehabilitate the degraded forest in Vellimutton based on lanscape ecology concepts and participatory forest management. A major breakthrough worth mentioning in this project is that stakeholder aspirations were taken into account with regard to the choice of species and management of the area. It can be expected that the project when completed will serve as a model for implementation of landscape ecology concepts and Participatory Forest Management (PFM).

The Panchayath President of Chungathara, Mr. Job inaugurating the planting programme at Vellimuttom in Nilambur Forest Division

Training in Landscape Ecology

As a part of the capacity Building project in Rehabilitation of Degraded forests using Landscape Ecology Concepts, funded by Australian Agency for International Development (AusAID), a three weeks training programme was organised at KFRI during February-March 1999. The resource persons included Professor Ian Ferguson (Melbourne University), Dr. E.K.S. Nambiar (CSIRO, Australia), Dr. David Flinn (DNRE, Victoria) and Mr. Peter Stephen (Melbourne University). They trained a team of 9 scientists from KFRI and three KFD officials in landscape ecology concepts, joint forest management and biodiversity priorities and sustainability. The training included several field trips to degraded forest areas. The training ended with a workshop in which several senior KFD officials participated. The programme was coordinated by Dr. J. Kallarackal (Plant Physiology Dn.)

Field visit to Vellimuttom by the trainees and AusAID experts

Recent Publications

SCIENTIFIC PAPERS

Balasundaran, M. 1999. Identification of spike disease resistant sandal trees and their clonal multiplication. In proceedings, 5th International Conference on Plant Protection in the Tropics. Malaysian Plant Protection Society, Kuala Lumpur. pp. 436-438.

Chinniah,T. ; Senguttuvan, T and Varma,R.V. 1998 Morphometric discrimination of larvel instars of teak defoliator, *Hyblaea puera* Crawer. Insect Environment. 4 (3):77

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Florence, E.J.M., Sharma, J.K. and Gnanaharan, R. 1999. Analysis of chemical properties of rubberwood stained by *Botryodiplodia theobromae*. In proceedings, 5th International Conference on Plant Protection in the Tropics. Malaysian Plant Protection Society, Kuala Lumpur. pp. 439-443.

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Mukteshkumar and Stephen Sequiera 1998. Some new records and little known species of ferns from Kerala, South India. Indian Fern J. 15: 102-105.

Mukteshkumar and Stephen Sequiera 1998. Two new species of *Oberonia* Lindl. (Orchidaceae) from Kerala, India. J. Orchid Soc. India 12 (1-2): 29-33.

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Priya & Bhat.K.M. 1999. Influence of rainfall, irrigation and age on growth periodicity and wood structure in teak. IAWA Journal 20(2):181-192.

Renuka, C. 1999. Indian Rattan distribution - An update. The Indian Forester 125 (6): 591-598.

Shaji, C.P. and Easa, P.S. 1999. A review of Amphibian studies in Kerala State, India. Zoos Print Journal. 14(5): 33-35.

Sharma, J.K., Balasundaran, M. and Florence, E.J.M. 1999. Increasing the productivity of eucalypts in Kerala through selection for disease resistance, higher growth and clonal technology. In proceedings, 5th International Conference on Plant Protection in the Tropics. Malaysian Plant Protection Society, Kuala Lumpur. pp.164-167.

Thomas, S. and Balasundaran, M. 1999. Immunological detection of sandal spike phytoplasma. In proceedings, 5th International Conference on Plant Protection in the Tropics. Malaysian Plant Protection Society, Kuala Lumpur. pp.177-181.

Thomas, S. and Balasundaran, M. 1999. Detection of sandal spike phytoplasma by polymerase chain reaction. Current Science 76: 1574-76.

Varghese A. O. and A. R. R. Menon, 1999. Ecological niches and amplitudes of rare, threatened and endemic trees of Peppara Wildlife Sanctuary. Current Science, 76 (9):1204-08.

Varghese A. O. and A. R. R. Menon, 1999. Measurement of biodiversity based on taxonomical heterogeneity of communities using Pielou's hierarchical diversity index. Journal of Economic and Taxonomic Botany, 22(3): 683-687.

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Varghese A. O. and K. Balasubramanyan. Structure, composition and diversity of the tropical wet evergreen forests of the Agasthiyamalai Region of Kerala, Western Ghats. Journal of South Asian Natural History 4(1): 87-98.

KFRI RESEARCH REPORTS

Easa, P.S. and Sankar, S. 1999. Study on man-wildife interaction in Wayanad Wildlife Sanctuary, Kerala. No. 166.

Sasidharan, N. 1999. Study on the flora of Chinnar Wildlife Sanctuary. No. 167.

Jayson, E.A. 1999. Studies on crop damage by wild animals in Kerala and evaluation of control measures. No. 169.

Bhat, K.V. & Pandalai, R.C. 1999. Development of appropriate tools for harvesting reed bamboos. No. 170.

Indira, E. P. 1999. Provenance trial in acacias No. 171.

Arun, L. K. 1999. Patterns and processes of fish assemblages in Periyar lake - valley system of southern Western Ghats. No. 172.

Easa, P.S. 1999. Status, habitat utilisation and movement pattern of larger mammals in Wayand Wildlife Sanctuary. No. 173.

Campus News

New Research projects

KFRI 318/99: Rehabilitation of degraded forests through landscape-based participatory approach.

Investigators: Dr J.Kallarackal, Dr U.M. Chandrashekara, Dr. P.V. Nair, Dr. G. Mathew, Dr. K.K. Ramachandran, Dr. P.S. Easa, Dr. Mammen Chundamannil, Dr. N.C. Induchoodan, Dr. V. Anitha.

Duration : 2 years (July 1999-June 2001)

Funded by : Planning and Economic Affairs (WGC) Department.

KFRI 319/99: Genetic Improvement of Teak

Investigators: E.P. Indira, E.M.Muralidharan (Genetics Division)

Duration : Three years (April 1999-March 2002)

Funded by : Kerala Forest Dev. Fund

KFRI 320/99: Testing an alternative thinning schedule for teak plantations based on a simulated model.

Investigators: Dr K. Jayaraman and Dr N.C. Induchoodan

Duration: 5 years (April 1999 to March 2004)

Funded by: Kerala Forest Dev. Fund.

KFRI 321/99: Management of soils of teak plantations for sustainable productivity

Investigators: Dr M. Balagopalan, Mrs. P. Rugmini and Mrs. M.P. Sujatha

Duration : 2 years (April 1999 to March 2001)

Funded by : Kerala Forest Dev. Fund.

KFRI 322/99: Screening of sandal provenances for spike disease resistance using molecular markers.

Investigator : Dr.M. Balasundaran,

Duration : 3 years,

Funded by : Kerala Forest Dev. fund

KFRI 323/99: Studies on forest seeds of Kerala

Investigators: K.C. Chacko

Objectives : 1. To gather data on seed characteristics, period of seed collection, processing and storage of important forestry species of

2. To bring out a handbook of forest seeds of Kerala.

Duration : 1 year (Apr. '99 - Jul. 00)

Funded by : Kerala Forest Department

KFRI 324/99 Investigations on Non-Wood Forest Produce Plants of Kerala.

Principal Investigator : K.K.N. Nair

Duration : 1 year (Apr. '99 - Jul. 00)

Funded by : Kerala Forest Dev. fund

KFRI 325/99 : Studies on composting

Investigator : Dr.M. Balasundaran, Mr.K.C. Chacko, Dr.J.K. Sharma

Duration : 1 year (Apr. '99 - Jul. 00)

Funded by : Kerala Forest Dev. fund

KFRI 326/99: Studies on root trainer technology for raising seedlings of forest tree species

Investigators: Dr.J.K. Sharma, Dr.M. Balasundaran, Mr.U.N. Nandakumar

Duration : 1 year (Apr. '99 - Jul. 00)

Funded by : Kerala Forest Dev. fund

KFRI 327/99 Developing a field identification key for rattans of Kerala..

Principal

Investigator : C. Renuka

Duration : 1 year (Apr. '99 - Jul. 00)

Funded by : Kerala Forest Dev. fund

Participation in seminars, symposia and workshops

Dr.C. Mohanan (Plant Pathology) attended National Conference on Mycorrhiza at the Institute of Microbiology and Biotechnology. Barkatullah University, Bhopal during March 5-7, 1999. He presented a paper on 'Mycorrhizal status of nineteen species of bamboo in Kerala, India' (by C. Mohanan and M. Sebastian). He also attended the International Conference on Frontiers in Fungal Biotechnology and Plant Pathogen Relations at Osmania University, Hyderabad during January 16-18 1999. Presented a paper entitled "Characterization of *Rhizoctonia solani* associated with forest nursery diseases and evaluation of chemicals and antagonists for disease management". Dr. Mohanan attended National Workshop on Rattan (Cane) at the Institute of Wood Science and Technology, Bangalore during February 4-5, 1999 and presented a paper on "Staining and deterioration of rattans and their management". He also attended IUFRO WP 7.03.04 Meeting on Diseases and Insects in Forest Nurseries at Suonenjoki Research Station, Suonenjoki, Finland during July 25-28, 1999 and presented the following papers.

1. Status of nursery diseases in India and emerging trends in seedling disease management.
2. Introduction of root trainer technology in forestry - impact on nursery disease management.
3. Epidemiology and integrated management of web blight in bamboo nurseries.

Dr. E.J. Maria Florence (Plant Pathology) participated in the Vth International Conference on Plant Protection in the Tropics held at Kuala Lumpur, Malaysia during 15-18 March 1999 and presented a paper entitled "Analysis of chemical properties of rubberwood stained by *Botryodiplodia*

theobromae". She also participated in the Silver Jubilee meeting of the Mycological Society of India and International Symposium on Tropical Mycology held at Chennai, India during January 20-22, 1999 and presented a paper entitled "Effect of humidity, temperature and moisture content of rubber wood on the growth of *Botryodiplodia theobromae".*

Dr. P.S. Easa (Wildlife) attended the seminar on Biodiversity Conservation -Challenges in 21st Century organised by the Forest Department on 14th March 1999 at Trivandrum. The Seminar was attended by the Forest Officials and the NGOs.

Dr. E.A. Jayson (Wildlife) attended the XXVI International Ethological Congress held at Bangalore from August 2 - 9, 1999 and presented a paper entitled "Habitat utilization of large mammals at Chimmony Wildlife Sanctuary". He also attended Interaction Meeting on mammalian Ecology at Desert Regional Station, Zoological Survey of India, Jodhpur during 9 - 12 February, 1999.

Dr. Mukteshkumar (Botany) attended the National Seminar on Biodiversity Conservation and Taxonomy of flowering plants on 27th November 1998 in Calicut and presented a paper on Concepts in Bamboo Taxonomy, past, present and future - a global perspective by Mukteshkumar and S. Sequira. He also attended the International Conference on Conservation of Tropical Species, Communities and Ecosystems during 2-6 December 1998 at Trivandrum and presented a paper on Diversity and Systematic Distribution of Vascular Epiphytes in the Kerala Part of Nilgiri Biosphere Reserve by Mukteshkumar and S. Sequiera.

Dr. K.K. Ramachandran (Wildlife) attended five week Speciality Training Programme in Landscape Ecology and Joint Forest Management as part of the India-Australian Training and Capacity Building Project (sponsored by AusAID) at the University of Melbourne, School of Forestry, Creswick, Dept. of Nature Resources and Environment Centre for Forest Tree Technology, Victoria, Australia during 26th April to 28th May, 1999.

Dr. J.K. Sharma (Plant Pathology) participated in the Vth International Conference on Plant Protection in the Tropics held at Kuala Lumpur, Malaysia during 15-18 March 1999 and presented a paper entitled, Increasing the productivity of eucalypts in Kerala through selection for disease resistance, higher productivity and clonal technology by Sharma J.K., Balasundaran, M., and Maria Florence, E.J.

Training Courses Imparted

The Plant Pathology division imparted one-week-training in Forest Pathology to Dr.V. Valluvaparidasan, Associate Professor and Mr.S. Nakkeeran, Asst. Professor from Dept. of Plant Pathology, Tamil Nadu Agricultural University during 12-19 July 1999. Dr.M. Balasundaran, Dr.C. Mohanan, Dr.E.J. Maria Florence and Dr.K.V. Sankaran served as Resource Persons from the Division.

Dr.M. Balasundaran, Dr.C. Mohanan, and Dr.K.V. Sankaran (Plant Pathology)served as resource persons for training of College teachers and students on Biodiversity under Biodiversity Education Programme.

Dr.M. Balasundaran, Dr.C. Mohanan and Dr.E.J. Maria Florence (Plant Pathology) served as resource person for training field staff of Hindustan Newsprint Ltd., Kottayam in Plantation Forestry and Forest operations.

Guest Lectures

Dr.M. Balasundaran and Dr.C. Mohanan (Plant Pathology) served as Resource Persons for the Refresher Course for College Teachers organised by Cochin University of Science & Technology, Cochin.

Mr. K.C. Chacko took a class for 35 students (carpentry trade) at ITI Kannur on timber trees.

Dr. P.S. Easa gave a talk on biodiversity conservation in Kerala to the visiting American students in Cochin University and another talk on on wildlife management options to the Forest Staff of Silent Valley. He also gave a talk on biodiversity conservation in connection with the World Environment Day celebration organised by School of Environmental Sciences, Cochin University of Science and Technology and to selected school students from different parts of Thrissur Education district in May, 1999. Popular lectures on wildlife and biodiversity conservation were also given in M.G. University, Farook College, Govt. Victoria College and N.S.S College. Lectures on Wildlife management for the benefit of the Forester trainees of Forest School, Arippa were also given by him. He also participated in a discussion on "Biodiversity Register" conducted by the AIR, Thrissur.

Dr. E.A. Jayson participated in a panel discussion on "Birds of Kole Wetlands" conducted by the AIR, Thrissur.

Honours

Dr. K.M. Bhat (Wood Science) was elected Vice-President of the Indian Academy of Wood Science in its General Body Meeting held in April 1999 in Bangalore.

Dr. K.K.N. Nair (Botany) has been conferred with an honary appointment to the Research Board of Advisors of the American Biographical Institute.

Dr. R.V. Varma (Entomology) has been conferred with an honorary appointment to the advisory council of International Biographical Centre at Cambridge, U.K.

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Second Circular

International Symposium on the occasion of the Silver Jubilee of KFRI

Tropical Forestry Research: Challenges in the New Millennium.

2-4 August 2000 at Peechi, Kerala, INDIA

Technical sessions :

1. Tropical forest research : Issues and Challenges
2. Sustainable Management of Natural Forests
3. Biodiversity and Conservation (Two concurrent sessions)
4. Management of Forest Plantations in the Tropics (Two concurrent sessions)
5. Forests and People (Two concurrent sessions)
6. Wood and Non-wood Forest Products

Please contact the Symposium Secretariat for further details :

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Latest information on the Symposium are available at our Website : www.kfri.org

Important Dates :

Receipt of Registration forms & Fee	: 30th April 2000
Receipt of full paper	: 15th May 2000
Arrival of Participant	: 1st August 2000
Inaugural sessions	: 2nd August 2000
Closing session	: 4th August 2000