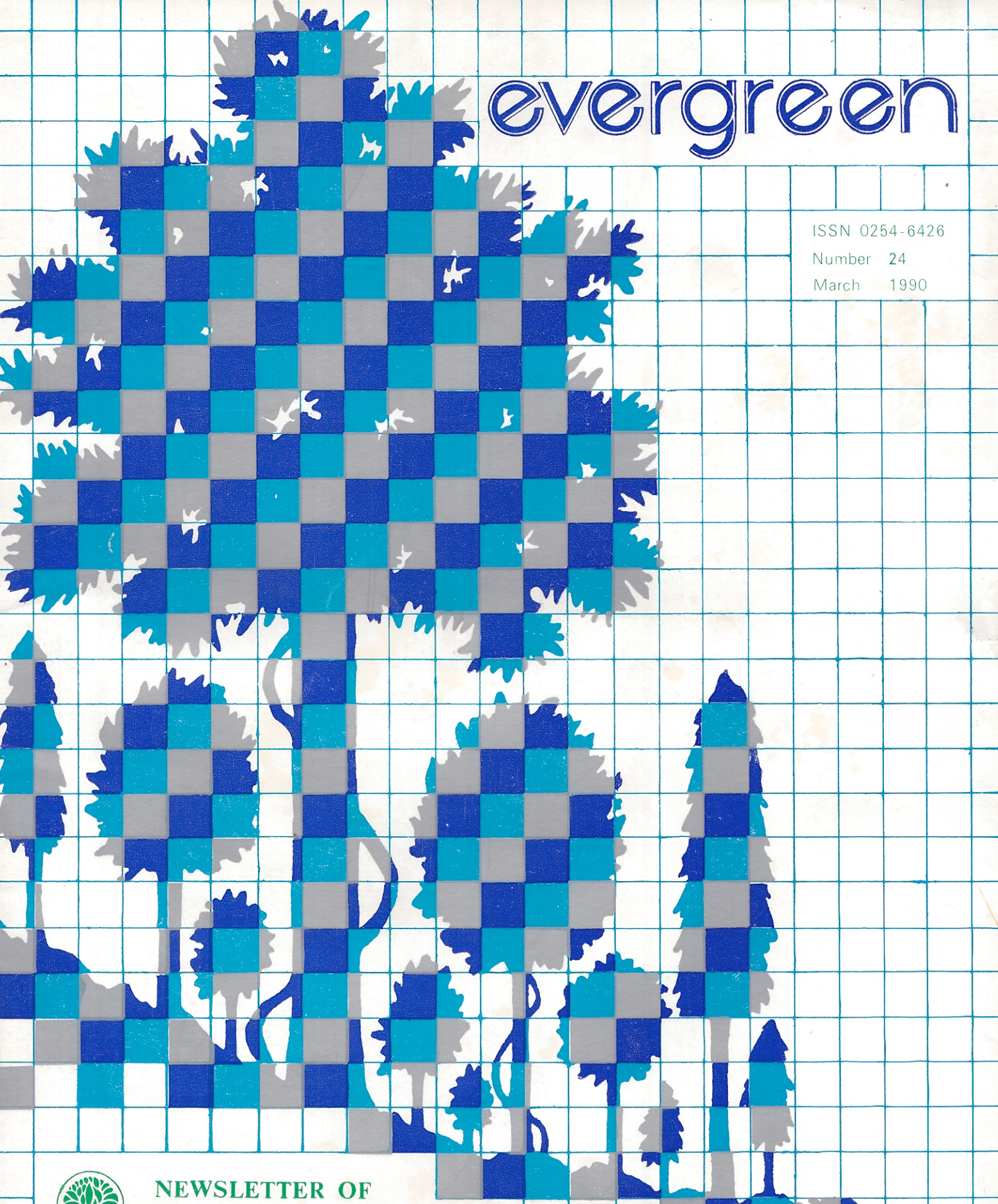
evergreen

ISSN 0254-6426
Number 24
March 1990



NEWSLETTER OF
KERALA FOREST RESEARCH
INSTITUTE, PEECHI 680 653

evergreen

newsletter of kerala forest research institute

ISSN 0254-6426

No. 24 March 1990

Address all communications to :

The Editor
Evergreen
Kerala Forest Research
Institute, Peechi-680 653
Kerala, India

Printed at Lumiere Printing Works, Trichur-20

CONTENTS

Evergreen, the KFRI Newsletter is currently brought out in March and September each year and is intended for free private distribution within the institute and the Kerala Forest Department. Free copies will also be sent upon request to other persons or institutions connected with forestry activities. The views expressed here are those of the authors and do not necessarily reflect views of the institute. All interested persons are invited to send comments, opinions and short articles for inclusion in the Evergreen. The Newsletter Committee reserves the right to choose among contributions and edit wherever necessary.

Weather data at Peechi during 1989

In the following paragraphs, an analysis of the weather data collected at the KFRI weather station, Peechi is presented. This station is located at latitude 10°32' N and longitude 76°20'E. The various weather parameters collected during the year are presented on a monthly basis in Table 1.

Temperature

The temperatures (temp.) have been measured with the help of thermometers kept in a Stevenson's screen. It may be noted that the maximum temperatures in 1989 were recorded in March. Although the mean max. temp. for March is 37.4° Celsius, three days recorded a maximum of 39° Celsius which is the highest temp. recorded. The lowest mean min. temp. was recorded in February. The days with the lowest temperatures were February 3rd and 5th when the mercury dropped to 17° Celsius.

Relative humidity

The relative humidity has been measured with the help of a hair hygrograph regularly checked against a wet and dry bulb thermometer. Except in January, the max. RH stayed above 90%. In most months, the RH reached condensation levels either due to the rains or dew formation. The most interesting aspect is the low min. humidities prevailing during November to March. This is mainly due to the easterly winds in this season. The lowest min. humidity was recorded for three days in February when the recordings showed an RH of 33% which is quite unusual for tropical parts of the world.

Rainfall

The total rainfall for the year 1989 was 2223 mm. Since we do not have previous data to compare, it is not fair to make any statement regarding whether it was normal or deficient. The so called summer rainfall or the non-monsoonic component of the total rainfall was approx 9%. June was the rainiest month when 30% of the total rains was received. The contribution of the South-West Monsoon was nearly 75% of the total. January and February were characterised by no rains. It can be reasonably assumed that the rains during October to December were due to the North - East Monsoon.

Bright Sunshine

The sunshine was recorded using the Campbell -Stokes sunshine recorder. February had the largest number of bright sunshine days. Although this number could have been more for March, cloudiness of the sky in March is the reason for a reduction.

Table-1. Weather data for 1989 at Peechi

Months	Mean Temp.(C) Max.	Mean Temp.(C) Min.	Mean RH(%) Max	Mean RH(%) Min	Monthly Rainfall (mm)	Daily Mean Wind velocity(Km/h)	Daily Mean bright sunshine (h)
Jan.	33.4	21.1	86	48	0(0)	9.0	8.4
Feb.	36.6	20.8	96	42	0(0)	6.5	10.2
Mar.	37.4	22.6	100	49	20(1)	4.8	9.8
Apr.	37.1	24.2	95	56	54(1)	4.2	8.5
May	34.6	23.1	98	67	122(3)	3.5	7.6
Jun.	30.0	21.7	100	78	668(20)	5.7	3.4
Jul.	29.5	22.1	99	82	504(14)	NR	4.2
Aug.	30.1	22.5	98	76	298(10)	4.0	5.3
Sep.	31.3	22.7	100	76	186(6)	2.0	5.6
Oct.	32.3	22.4	100	76	329(9)	NR	6.0
Nov.	32.2	22.0	91	62	13(1)	NR	8.3
Dec.	32.3	21.7	93	61	24(1)	NR	9.5

NR : Not recorded. RH : Relative Humidity. The figures in parentheses indicate the number of rainy days when rainfall was >10mm.

Division of Plant Physiology

Why genetic conservation of forest resources?

Indiscriminate exploitation of natural resources started years ago and the pressure on the forest is on the increase. In many countries natural forest ecosystems have been exploited to such an extent that little or no primary forest now remains.

Large scale deforestation lead to many adverse ecological consequences. One of the most important ill effects is the loss of forest genetic resources. Many species of potential importance are often under threat of genetic depletion or even extinction before they are known. Many of them may be very much valuable in future as alternative resources, a life support for certain fauna, a source of resistant genes or for use in breeding programmes for desired characters.

The rate of genetic degradation is the highest in the tropics: It is feared that further reduction in forest area is likely, since land is in heavy demand for agricultural and plantation purposes. Loss of genetic resources is not confined to the tropics alone. But there is greater concern for tropical rain forests because of its species diversity and genetic resources which will be irrevocably lost due to deforestation. Degraded areas can be afforested but when a plant or animal species or a population becomes extinct, or the genetic variation degraded it is lost for ever.

Degraded areas can be afforested but when a plant or animal species or a population becomes extinct, or the genetic variation degraded it is lost for ever.

Concern for the conservation of natural genetic resources, has been increasing over the past two to three decades. Conservation can be *in situ* as natural stands or *ex situ* as clone archives, germplasm banks, or as seed, tissue or pollen banks. Whatever be the mode of conservation, it is necessary to include all inter and intraspecific genetic variations. Efforts towards conserving nature in the past were mostly aimed at saving endangered ecosystem or species but not to conserve the genetic diversity within the species. Identification of endangered populations within a species is more difficult than the identification of endangered species as a whole.

Before initiating any planned conservation programme, proper exploration and evaluation of genetic resources are to be done. Efforts for conservation often fail due to lack of basic knowledge of the species distribution, genetic variation, variation pattern and prospects for use later on. There are certain steps recognised for the genetic conservation. These include; 1. botanical and genecological exploration, 2. collection of seeds and other reproductive materials from different areas, 3. replicated field trials and their evaluation, 4. estimation of the extent of genetic variation and its adaptability to a range of environmental conditions, 5. utilization aspects and 6.*in situ* or *ex situ* conservation.

For genecological exploration, information should be collected on the following:

a. actual distribution and regeneration capacity;
b. capacity of the species to grow in different edaphic and climatic zones in different parts of its range.
c. breeding system, mode of pollination and seed dispersal;
d. parts of the range where the species under study is the most varied and least varied;
e. distinct forms if any and their comparative frequency in different localities;
f. mode of propagation and possibility of vegetative propagation; and
g. possibility of storing seed or pollen with viability for a long time.

Genecological studies conducted in temperate tree species proved that there is high degree of genetic variation in almost all species. A few studies carried out in tropical and subtropical tree species also show that remarkable and economically important genetic variations exist within species.

There is difference of opinion among scientists about the minimum population size to be conserved. A basic rule in genetic conservation is that, for habitually out breeding species, the amount of inbreeding should be kept to a minimum. High degree of inbreeding leads to loss of fitness and increased mortality in such species. In every small and isolated population gene frequency changes occur which lead to fixation or loss of some alleles. Hence the breeding system, pattern of genetic variation and such other factors which vary from species to species should be taken into consideration before fixing the minimum viable population.

Forest trees widely used for afforestation are under little risk of being lost, but their genetic variants which are promising but still unknown are under threat. The number of tropical species which are unutilized or largely unknown but of potential importance are far more than

those exploited and used. To conserve each of them is impracticable but many of them may be conserved incidentally wherever *in situ* conservation of valuable species and their ecosystems is practised.

Works at international level, have been started long ago for genetic conservation of some tropical pines and eucalypts and a few species of Acacia, Prosopis etc. In India also work has been started in this line, but mainly for Teak. There are three National germplasm banks of Teak, one each at Lohara in Maharashtra, Belgaum in Karnataka and Mulug in Andhra Pradesh, besides many clonal seed orchards in various states. It is necessary to conserve other species also in a scientific way, otherwise the high pressure experienced on natural forest will result in genetic depletion or even extinction of several species.

E.P. Indira
Division of Genetics

Wood quality improvement by pruning

One major complaint about plantation grown teak timber is that the logs are too defective to meet sawn wood specifications. It is a fact that lumber recovery from most of the teak logs is as low as 30-45%. Knottiness is one of the defects that affects sawn wood out turn and strength properties. If profuse branching of trees is controlled by pruning at the early stages of growth loss due to knottiness can be avoided or minimised.

Pruning practice has now become popular in many parts of the world because;

- it is a new method of producing superior quality sawlogs
- it is the most effective and quickest method of improving wood quality;
- it improves the quality from knotty to clear wood and generates employment for rural people.

What trees to prune?

Only healthy trees should be selected for pruning.

When to prune?

- In early phase of tree growth, for instance, when the dbh of dominant trees is 10-15 cm (This may vary depending on species).
- If the trees are about 10 m high, pruning is carried out in a single operation upto a height of 5-6 m.
- If the trees are 10-15 cm in diameter but well under 10 m overall height they may be pruned in two stages leaving a gap of several years.

How to prune?

- Branches should be pruned flush with the trunk. If the branch base is left it will delay the occlusion.
- After pruning, the green crown should be at least 40% of the trees total height.

What tools to use?

Four types of tools* are illustrated below. The design of these tools take into consideration ergonomic biological and technical aspects of pruning.

1. Pruning knife (Product No. 16501, FISKARS)

This knife is used for pruning at lower level i.e. upto 1.5 m height. Pruning is carried out as shown in Fig.1. This double edged knife is provided with two handles.

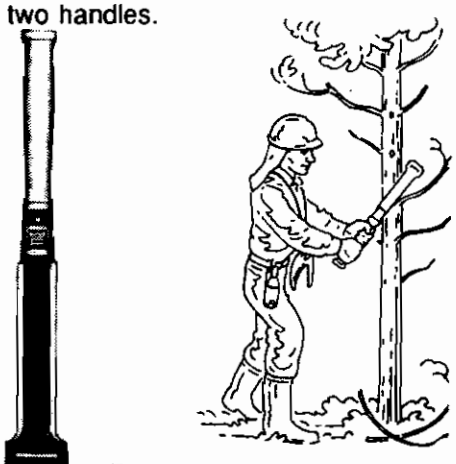


Fig:1 Pruning knife (Product No. 16501)

2. Branch pruner (Product No. 163000)

This tool is suitable for working at intermediate height levels (1.5 - 3m). Place the upper jaw of the pruner on the branch and simply pull the handle (Fig.2). The lever mechanism transmits force to the lower jaw and branches upto 4 cm in diameter can be snipped off.

3. Disc-pruner (Product No. 16400)

This tool is used for upper level work (3 to 6 meters). Raise the disc pruner to the maximum pruning height, place the discs above the branch and cut it off by a jerk (Fig.3) Work downwards, from branch to branch. If necessary, a weight can be attached to the bottom of the handle to add momentum.

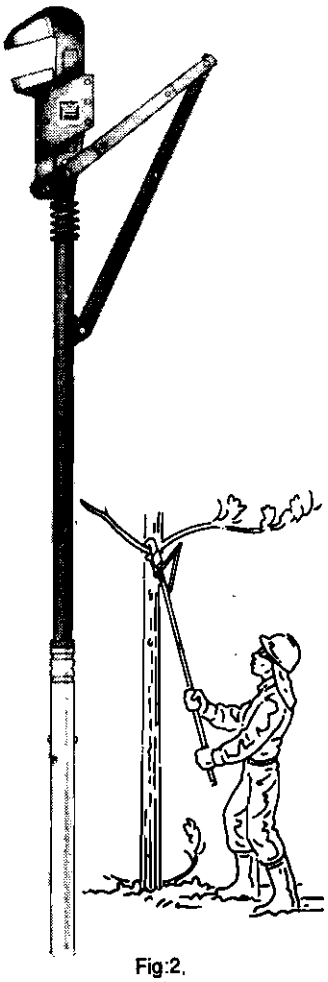


Fig:2.

Branch Pruner (Product No. 163000)

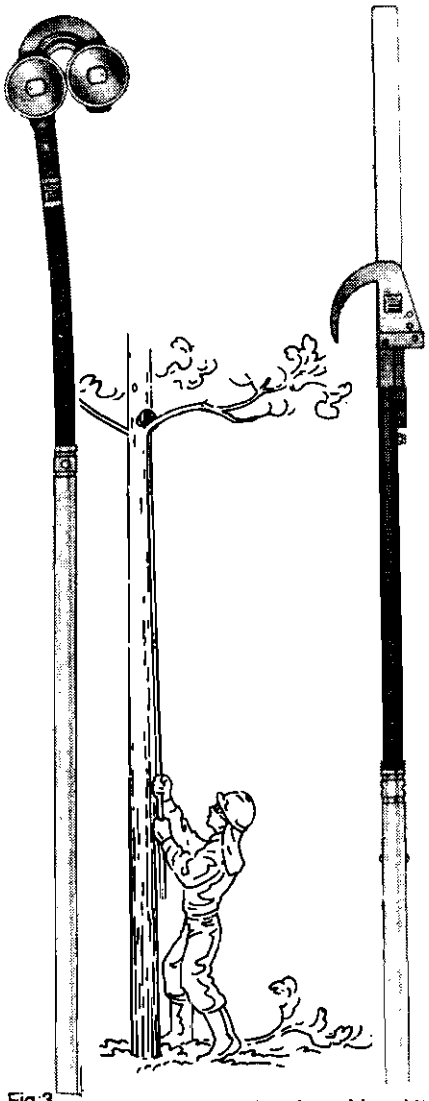


Fig:3 Disc Pruner (Product No. 16400)

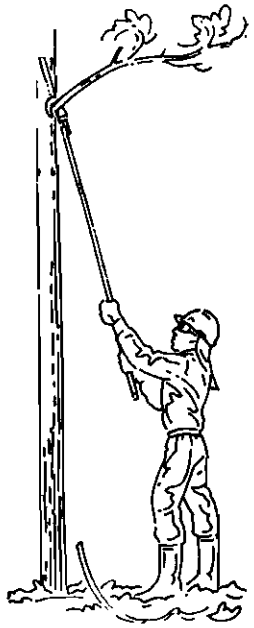


Fig:4

Self feeding pruning saw (Product No. 16600)

4. Self feeding pruning saw (Product No. 16600)

This tool is suitable for intermediate and upper level works. Place the hook over the branch and pull downwards on the handle, the saw blade is automatically pressed against the branch with optimum pressure (Fig.4). If the branch is not cut through at the first pull, the internal spring mechanism returns the blade to the starting position and the process can be repeated.

---

* These tools are designed by FISKARS, Mannerheimintie, 14A P.O.Box 235,00101 Helsiniki 10, Finland and reproduced here with their permission.

K.M. Bhat
Division of Wood Science

Tree volume prediction now possible through stump measurements

It is difficult to make an estimate of the loss when trees are lost through illicit felling since the measurements of gbh (girth at breast height) are not available. Quite often a stump is left in the field on which some measurement is possible. If such measurements are related to the gbh then estimation of tree volume is possible through volume tables. Keeping this in view, prediction equations were developed to predict gbh from girth measurements made on the stump. A series of measurements on girth at different heights of a tree starting from 7 to 137 cm from the ground level supplied by the Kerala Forest Department (T.K. Raghavan Nair, K. Sasidharan Nair and M. Govindankutty, Conservators of Forest) Fifteen species were utilized for the study. The different species are:

	Local name(s)	*Trade name*	*Botanical name*
1	*Venthekku*	*Venteak*	*Lagerstroemia microcarpa Wt.*
2	*Unnam/Chadachi*	*Dhaman*	*Grewia tiliifolia Vahl*
3	*Nanku/Churuli*	*Mesua*	*Mesua ferrea L.*
4	*Manimaruthu*	*Jarul*	*Lagerstroemia reginae Roxb.*
5	*Manjakadambu*	*Haldu*	*Haldina cordifolia (Roxb.) Ridsd.*
6	*Kambakam*	*Hopea*	*Hopea parviflora Bedd.*
7	*Vellakil*	*White cedar*	*Dysoxylum malabaricum Bedd. ex Hiern.*
8	*Kariveeti/Eeti*	*Rosewood*	*Dalbergia latifolia Roxb.*
9	*Irul*	*Pynkado*	*Xylia xylocarpa (Roxb.)Taub.*
10	*Kulamavu*	*Ladder wood*	*Persea macrantha (Nees) Kosterm.*
11	*Venga*	*Bijasal*	*Pterocarpus marsupium Roxb.*
12	*Vellappayin*	*Whitedhamar*	*Vateria indica L.*
13	*Pullamaruthu*	*Kindal*	*Terminalia paniculata Roth.*
14	*Thekku*	*Teak*	*Tectona grandis L.f.*
15	*Thembavu/ Karimaruthu*	*Laurel*	*Terminalia crenulata Roth.*

Girth at 10 cm above ground was used as a predictor since a stump of at least that height will be left in the field. Girth at 10 cm was obtained through linear interpolation from girths at 7 and 17 cm above ground. Regression equations were fitted between interpolated girth at 10 cm above ground and the corresponding gbh for each species separately. Volume estimates were arrived at using the predicted gbh values with volume tables of Nair, 1971 (Commercial Volume Tables for the Forest Trees in Kerala (Provisional). Kerala Forest Department, Trivandrum. pp. 41). Tables are now available for predicting tree volume from girth measurements made at 10 cm above ground for the species listed above.

K. Jayaraman, A.R. Rajan and P. Rugmini
Statistics Division

Yield from eucalypt plantations in Kerala.

Large scale planting of eucalypts was initiated in Kerala by the Forest Department in the late 1950's. At the end of 1987 an area of 44108 ha has been under eucalypts plantations in Kerala. The eucalypt wood obtained from plantations is utilized by the pulp and paper industries which are crucially dependent on the availability of the material. With the present scarcity of raw materials for the industries, an evaluation of the yield potential of plantations in Kerala is of importance. The existing yield tables (Pande, 1978[1]; Sharma 1978[2])can indicate the expected yield under a particular site quality and stand density in the field. But they cannot answer questions on the yield levels obtained from the plantations in Kerala unless information on site quality and stand density are available for individual plantations. The results of a short study conducted to obtain information on the levels of yield that are realized under the actual growing conditions in the field and to evaluate the effect of some of the factors that cause variation in these levels are reported here.

Data on first rotation yield from plantations at the time of felling were gathered from records kept at the different forest range offices in Kerala. There were 173 plantations which differed with respect to age at harvest and espacement; belonged to Wynad, Kozhikode, Trichur, Vazhachal, Munnar, Pamba, Punalur, Thenmala and Trivandrum Forest Divisions. Records on yields of *Eucalyptus tereticornis* were available for 111 plantations and of *E.grandis* for 62 plantations. The area of individual plantations varied from 2.63 to 197.48 ha. The analysis indicated that the differences in yield per unit area are mainly attributable to the differences in species, rotation age and size of the plantations. A large part of the variation remained unexplained. This is attributable to the differences in the site productivity and variation in the stocking at the time of felling caused by fire, diseases, illicit felling etc.

The mean yield (debarked wood) obtained at a rotation age of 10 years for the two species and other details are given below.

	E. tereticornis	*E. grandis*
Yield (t/ha)		
Mean	66.53	109.29
Minimum	1.57	30.72
Maximum	192.06	225.73
Stocking (Number of trees/ha)		
Mean	1367	1308
Minimum	1075	891
Maximum	2500	2500
Number of Plantations involved	56	12

The mean yield of *E. grandis* is higher than that of *E. tereticornis* but the prominent feature is the large variation observed within each species due to the reasons mentioned above. These yields are not directly comparable with the figures in yield tables as it requires knowledge of the stand density at the time of felling. However, the figures represent the average yields that are actually realisable in the field for the two species at the specified rotation age. In spite of the large variation in the original espacement, the effect of this factor did not turn out significant in the analysis and we may infer that proportional number of stems are not maintained at the time of felling. Similarly large variation in yields within the divisions had made the differences between the divisions appear nonsignificant. Surprisingly the size of the plantations had a negative effect on yield/ha. Larger plantations in general showed lesser productivity.

K. Jayaraman and C.N. Krishnankutty
Statistics Division

1. Pande, G.C. 1978. Yield tables for Eucalyptus grandis. Indian Forest Records (NS) Forest Management and Mensuration. Vol 2(1). FRI and Colleges, Dehra Dun.

2. Sharma, R.P. 1978. Yield tables for Eucalyptus hybrid (plantation) for various levels of stocking. The Indian Forester, Vol 104(6): 387 -397.

Diseases of forest trees in Kerala

5.Diseases of Eucalypts in Plantations

A disease survey conducted during 1982-85 revealed that eucalypt plantations in the state are affected by a large number of stem and leaf diseases. In the last issue of Evergreen (No. 23, September 1989) information about root rots, wilt and a few stem cankers were given.

This article deals with a few more stem diseases recorded during the survey.

1. Macrovalsaria stem canker

Causal organism : Macrovalsaria megalospora

Species affected :

1. E. tereticornis.
Locality : Elanad,Potta,Pezhad,

2. E. grandis.
Locality: Mullachal

Symptoms : Generally the infection occurred at the basal part of the stem, characterized by the formation of a large number of black fructifications, scattered over the bark (Fig. 1 a). The affected stem developed canker and the tissues underneath showed browning. When the stem was completely girdled the foliage wilted and the tree slowly died, no epicormic shoots developed.

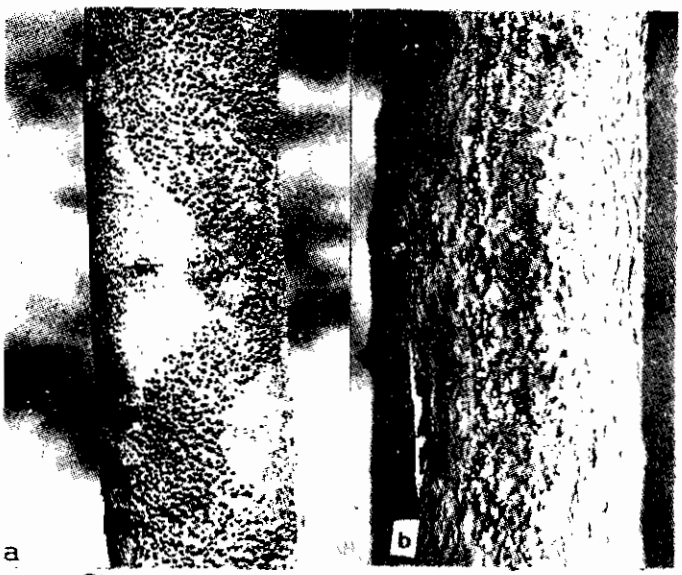


Fig:1 a, Stem canker of ***Eucalyptus*** caused by *Macrovalsaria megalospora*
b, Pink disease of *Eucalyptus terticornis* (necator stage) caused by *Corticium salmonicolor*

2. Thyronectria stem canker

Causal organism : Thyronectria pseudotricha

Species affected :
1. E.tereticornis.
Locality : Kakkavayal, Vazhachal, Anakulam.

2. E.camaldulensis
Locality: Vazhachal

3. E.torelliana
Locality : Vazhachal

Symptoms : Initially the conidial state of the pathogen (anamorph) developed near the base of the stem, which soon spread upwards covering a large area. The affected tissues of the stem developed browning and when stem completely girdled it caused wilting and death of trees. The perfect stage (teleomorph) was formed in loose clusters or scattered over the dead stem. No epicormic shoots were observed on the affected trees.

3. Hysterium stem canker

Causal organism : Hysterium angustatum

Species affected : *E.camaldulensis*
Locality : Vazhachal

Symptoms : The pathogen caused extensive cankers on branches and upper part of the stem. The affected tissues of the stem showed pronounced browning. On dead stem, numerous characteristic black aggregated or single fructifications developed.

4. Pink disease

Causal organism : Corticium salmonicolor

C. *salmonicolor* produces four stages viz. cob web, pustule, pink encrustation and necator on eucalypts.

Species affected : *1. E.tereticornis*

Locality : Varavoor, Vazhachal, Kottappara, Pezhad, Thalakode, Arippa, Onthupacha

2. E.grandis
Locality : Periya, Noolpuzha, Thrissillery, Mullachal.

The site of the plantation appeared to have a considerable impact on the incidence of pink disease. *E.tereticornis* plantations in high rainfall area, in a valley surrounded by hills at low elevation (less than 500m above msl) or near a permanent water source recorded a high incidence of pink disease, as all these conditions contributed to high humidity which favoured infection and spread of the disease.

Among the cultural practices, raising of tapioca as a taungya crop for the first two to three years of establishment also had considerable impact on the incidence of pink disease. Tapioca grows faster and forms a closed canopy which provide suitable microclimatic conditions for pink disease infection. Under identical conditions a crop of either ginger, sesame or paddy as taungya had low incidence.

Symptoms : Usually the disease was observed in plants of two year old and above but infection of one year old plants and coppice shoots was also noticed. The fungus possibly infected the main stem or branches through the lenticels. Tissues of the inner bark, including cambium were killed and showed prominent browning. The infected area became depressed which during the dry period developed vertical split, on the bark (Fig. 1 b); no oozing of kino was noticed from the cankers. The apical shoot above the canker died when the stem was completely girdled. Numerous epicormic shoots developed from the healthy stem just below the canker. These shoots also got infected and killed following wilting and drying. One of these shoots usually survived and became a leader, which also gets infected in the following season. Thus the infected trees, which appeared bushy due to repeated infections of pink disease became frail and weak. The yield and productivity of plantation was reduced considerably as the trees showed poor growth. Infection of older trees (3 - 4 year old) usually resulted in localized cankers and were normally not girdled.

Control measures : Though calixin and Bordeaux mixture (in paste or spray form) are highly effective in controlling the disease, application of the fungicide is not sufficient to prevent fresh infections. The only possible long term solution for controlling the pink disease is through species selection and tree improvement.

5 Cytospora stem canker

Causal organisms : a. Cytospora eucalypticola b. C.eucalypti sp. nov.

Species affected : *1. E.tereticornis*

Locality : Begur,Pezhad, Anakulam.

2. *E. grandis*

Locality: Meenmutti

Symptoms : In branch and twig cankers, infection occurred on any part of the stem. The tissues of infected region showed pronounced browning and leaves wilted and defoliated. Numerous, black conidiomata developed scattered over the infected region (Fig.2). Complete girdling usually resulted in death of the branches.

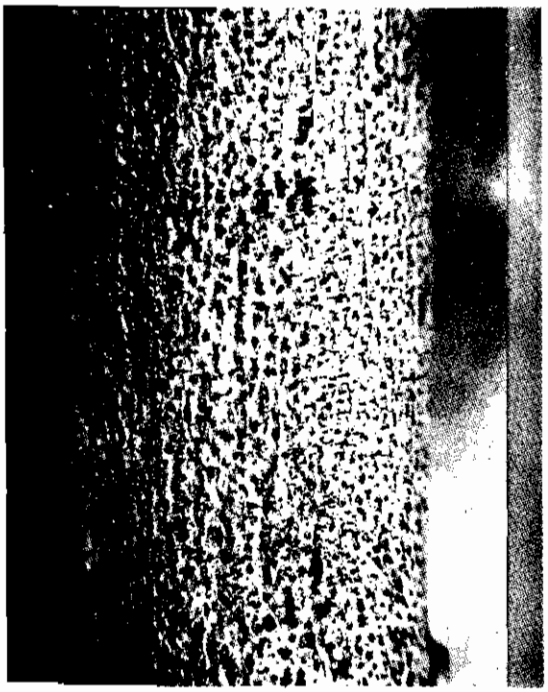


Fig.2 Cytospora stem canker of *Eucalyptus tereticornis* caused by *Cytospora eucalypticola*

Infection on the main stem of coppice shoots was initially observed at the base near the stump and later it gradually spread towards the apex. Girdling due to the canker at the base resulted in wilting of leaves and death of shoot. Numerous conidiomata were developed on the dead stem. In severe cases the infection even spread to roots killing the stump. Generally all the shoots of a stump got infected and died.

6. Nattrassa stem canker

Causal organism : Nattrassa toruloidea

Species affected:. *E.tereticornis*

Locality : Potta, Elanad, Tamarassery

Symptoms : Generally the infection appeared on the stem near the ground and later spread upwards covering a large part of the stem. The infected area got differentiated in a depression which later turned into a canker (Fig. 3). Occassionally, the roots also got infected and complete girdling of stem resulted in death of plants. On the canker, numerous minute fructifications were developed arranged in vertical broken lines. The tissue of the affected area showed greyish-black discolouration in which brown, septate, thick-walled, inter and intra-cellular mycelia were found in abundance.

Fig:3.

Stem of *E. tereticornis* infected with *Nattrassa toruloidea*

7. Stem decay

Causal organism : (a) Microporus xanthopus (b) Lentinus squarrosulus

Species affected : *E.citriodora*

Locality : Kottappara

Symptoms :

(i) Microporus decay

Large number of fructifications were observed on a partially dead trunk on one side from base to 60 to 75 cm above ground (Fig. 4 b). The tissues in the affected area becomes soft and pulpy and roots also got partially decayed.

(ii) Lentinus decay

The stem near the ground was affected with decay where numerous fructifications developed in groups (Fig. 4 a). Extensive fan shaped mycelium was observed on the decayed and the surrounding healthy tissues.

Stem of *E. citriodora* affected by

Fig:4a, *Lentinus squarrosulus and*

Fig:4b *Microporus xanthopus*

J. K. Sharma
C. Mohanan
E.J. Maria Florence
Division of Plant Pathology

Pesticide residues.

Introduction

The topic of pesticide residues is both emotional and sensational. The history of pest control is as old as human race. Insect pests attracted more attention as they could be seen with naked eyes and the devastation caused by them was felt acutely. The war between man and insects was onesided until the insecticidal properties of DDT was discovered towards the end of the second world war. DDT and BHC, another chemical came to the market simultaneously, were widely used for the control of the insect vectors of human diseases and crop pests. Large scale use of modern pesticides followed in public health programmes and agriculture.

The credit of bringing to light the undesirable qualities of pesticides should go to the late Miss Rachel Carson who wrote the book "Silent Spring" in 1950s. Being the forerunner of the synthetic insecticides DDT has been subjected to more scientific studies than any other pesticides so become the most notorious, inspite of the fact that Nobel prize was conferred on Dr. Paul Muller of Switzerland for discovering its insecticidal properties.

Gains by using pesticides

During the past 35 years India's population has doubled, life expectancy has increased from 22 years to 57 years and annual production of food grains and pulses has gone up 3-4 times. The spectacular decrease in death rate and increase in life expectancy has been brought about by wiping out epidemics like malaria, plague and cholera using modern synthetic insecticides. Till the advent of DDT, about two million people died in India alone annually due to malaria. The green revolution was brought about by using treated seeds of high yielding varieties, and fertilizers. Unfortunately, the conditions favourable for the growth of high yielding varieties also favoured pest attack and their rapid multiplication. Use of pesticides became an unavoidable tool in the hands of agriculturists in their attempts to feed and clothe the ever increasing population.

Factors contributing to pesticide residues

When we talk of pesticide residues in India, generally we mean insecticide residues. Out of ca. 72000 tons of pesticides used at present ca. 78% are insecticides. The organochlorine group of insecticides form nearly 65% of this. Herbicides also have residual effects, but it is not as hazarduous as insecticides, unless wilful abuse takes place or basic precautions are neglected. Usually fungicides do not have any problem of residues. The organophosphorus group of insecticides are highly harmful poisons, but they break down in the atmosphere more rapidly, especially in the presence of water and minimise residual effect under field conditions.

The organochlorine group of insecticides comprising of BHC, DDT, dieldrin, endosulfan and heptachlor are highly persistent. These are neither degraded by sunlight, moisture, mild acids and alkalies nor soluble in water under normal conditions. Hence these pesticides remain on the treated surface for a long time. As these pesticides dissolve in fats and oils, they accumulate in fatty deposits of living organisms and can be detected as residues in milk, eggs, etc. They also undergo biological magnification in the food chain. All the pesticides used on land are slowly leached out into waterways where they come into contact with plankton and small quantities are absorbed by them, organisms feeding on them accumulate larger quantities. Predatory fishes and birds feeding on aquatic life carry still larger quantities and human beings at the top of the food chain gets the largest dose. These properties are responsible for finding residues of chlorinated insecticides in commodities which were never treated with pesticides. Ignorance and improper guidance in using pesticides and use of cheaper chemicals with lesser effect added to the complexities of pest control.

Alternatives to pesticides

Whatever be the arguments for and against pesticides it is imperative that pesticides have residual effects. The possible solutions lie in finding appropriate biological control agents, self protecting plants, selective chemicals harmful to pests only and creating pest free houses.

Of these, biological control is time consuming and highly expensive. The parasite predator should not have natural enemies, should be able to withstand the local climatic conditions and multiply under field conditions quickly to check the pest. Building up resistance against all pests in plants, animals and man is almost impossible. Chemicals which are destructive to pests alone

are not available. It is not possible to construct completely pest free houses.

A practical solution is to continue the use of pesticides taking maximum care. Use pesticides only when it is essential following all directions and taking all precautions. This is possible only if all the users are aware of the desirable and undesirable qualities of the pesticides. We cannot totally abandon the use of pesticides because it will adversely affect agriculture. The majority of people are interested in food and freedom from diseases than the absolute absence of non detectable pesticide residue in their food.

Tolerance level

Since we cannot wish away pesticide residues and we have to live with it, the one way to combat it is by fixing tolerance levels for various pesticides. Therefore all developed countries have prescribed tolerance levels for pesticides in food commodities. Food items containing pesticide residues below the tolerance level is not dangerous for human consumption. In the developed countries, food products are withdrawn from the market if they reveal pesticide residues beyond tolerance levels. In India, under the prevention of food adulteration act tolerance levels have been fixed for about 20 pesticides in a few commodities. But there is no agency to analyse the pesticide residues in food products and to strictly enforce it.

Residue analysis

Samples for residue analysis are usually drawn from retail markets. In India it is very difficult to obtain a sample with a known history of pesticide treatment. The method of collecting samples from retail market is called the market basket survey. After cutting or mincing the samples, a representative portion is extracted with a suitable solvent to extract the pesticide out. During the process of extraction, if other undesirable materials get mixed up with pesticide, they should be removed. The cleaned or purified extract, is anlaysed by bioassay or chemical assay to detect and quantify the pesticide or its metabolites. In modern laboratories instrumental analysis using gas liquid chromatographs equipped with highly sensitive detectors are used for residue analysis. Regulatory analysis of samples are not routinely carried out in India as we do not have enough laboratories and trained personnel to carry out this highly technical work. Analysis of different commodities like cereals, eggs, fish, fruits, meat, milk, pulses and vegetables have been carried out at Bombay, Calcutta, Hyderabad, Lucknow, Ludhiana, Mysore and New Delhi. The work carried out in respect of market basket samples has been mainly for insecticides and that too organochlorine insecticides. In cereals, eggs, milk and pulses residue should be only in negligible quantities and hence if any pesticide is detected in them it exceeds the tolerance levels.

Conclusion

Since it is imperative that we have to feed and clothe our population and protect them from diseases, the use of pesticides have to continue. It is not easy to prevent the agriculturists from using chemicals which they consider cheap and more effective. They have to be educated on all the precautions to be observed. As long as pesticides are used reports about pesticide resides will also appear. The future residue chemists may report residues as molecules, in their ceaseless effort for perfection. Appropriate extension and surveillance service can keep pests, pestilence, poisoning and pollution under check by advising the pesticide users which pesticide is to be used when, where and in what quantities.

M.I. Mohamed Ali
Division of Plant Pathology

KFRI COSPONSORED NATIONAL SEMINAR ON RUBBER WOOD

Kerala Forest Research Institute co-sponsored the First National Seminar on Rubber Wood, conducted by the Rubber Research Institute of India, on 12 December 1989. Dr. R. Gnanaharan, Sri. T.K. Dhamodaran (Wood Science), Dr. George Mathew (Entomology) Shri. M.Balasundaran, Smt. E.J. Maria Florence (Plant Pathology) and Shri. C.N.Krishnankutty (Statistics) participated in the seminar. The 6 papers they presented are given below:

Research needs in utilization of Rubber Wood (R. Gnanaharan)

Industrial wood use in Kerala - the role of rubber wood (C.N. Krishnankutty)

Effect of micro-climatic factors and moisture content of Rubber wood on the growth of *Botryodiplodiatheobromae* causing sapstain (E.J. Maria Florence)

Insect pests of rubber wood in Kerala (George Mathew)

Upgradation of rubber wood through boron diffusion treatment (T.K. Dhamodaran and R. Gnanaharan)

Laboratory evaluation of preservative treated rubber wood against two white rot fungi (M. Balasundaran and R. Gnanaharan)

Idukki Wildlife sanctuary.

Compared to the other major wildlife sanctuaries in Kerala such as Periyar and Parambikulam, the Idukki wildlife sanctuary has a fairly degraded habitat with low density of animals. An examination of the past history of the area, impact of the Idukki hydroelectric project and many anthropic factors peculiar to the area are essential for a proper understanding of the present status of the sanctuary. About 70 km of forest between the two arms of the Idukki reservoir was declared as a wildlife sanctuary in 1976 (Fig.1).

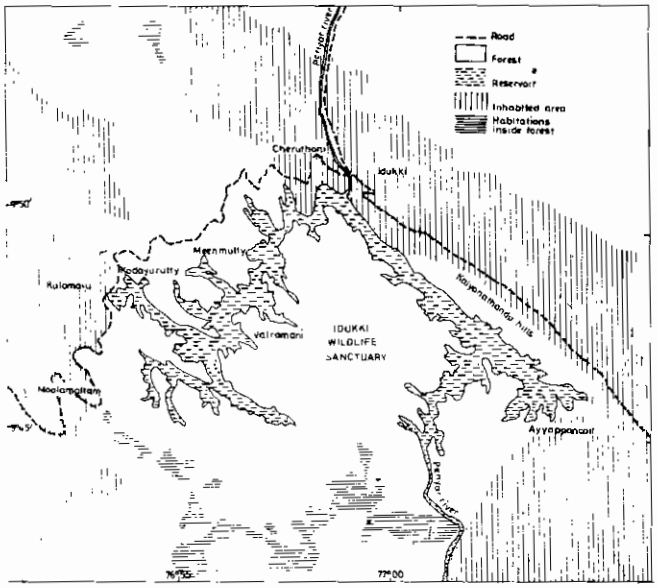


Fig:1

Map of Idukki sanctuary

Earlier accounts dating back to the 18th century describe the Periyar river flowing through narrow gorges and unspoilt wilderness in the Idukki region. Tribals inhabiting the area were described as practising shifting cultivation during the latter part of the 19th century. Many indications suggest that these tribals migrated to this part from elsewhere. Large tracts of nearby areas have been brought under tea cultivation since 1870.

The human settlement in the present submersion area seems to have occurred during the turn of the century. The settlers report that at that time of colonisation, animals like elephants, gaur, sambar, barking deer, wild-pig, bonnet macaque, tiger, panther and bear were present in the Idukki area. There have been a series of encroachments in the fifties.

Disturbances to the Idukki region started by the turn of the century. Construction of the hydroelectric project accelerated the pace.

A proposal for constructing a dam at Idukki to produce about 50 MW of electricity was made in 1937. This was subsequently enlarged and modified in 1947 to produce 780 MW of electricity. The project involved consrtuction of dams at Idukki, Cheruthoni and Kulamavu (Fig. 2) creating a lake of about 75 km^2. The construction work started in 1963 and extended up to 1976. Implementation of the Idukki hydro-electric project brought about rapid improvements in accessibility and communication to remote areas along with colonization of forests by new settlers. Recent estimates show that Idukki district has about 50% of the total area under forest.

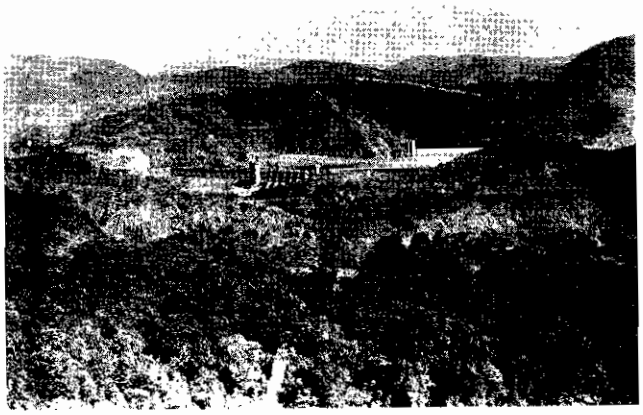


Fig:2

View of the project area

A study on the post construction environmental status of the Idukki project area was conducted from 1980 to 1984 by the Kerala Forest Research Institute. For the study, a larger area of about 150 km^2 including portions lying between the reservoir and the Kulamavu -Idukki road and Idukki - Ayyappankoil road was chosen As part of the study, the status of wild animals, vegetation and anthropic factors were examined in detail. The impacts of construction workers staying in the project area, drawing of power lines, laying of roads, development of township and effect of resettlement of

displaced people on wild animals were examined. Sighting records and indirect evidences were employed for documenting animal abundance and distribution. Habitat quality was recorded on a gridded map by ground check.

Ward and Connor (Memoirs of the Survey of Travancore and Cochin States, Surveyor General's office, Madras 1825) and Bourdillon (A report on the forests of Travancore. Govt. Press, Trivandrum, 1893) had described animals like elephants, pigs, etc. as being present in this tract during the last century. Animals like sambar, wild pigs, wild dogs, hare, porcupine, barking deer and mouse deer, though not readily sighted were present in many plots as indicated by pellets and foot prints. There was no sign of animals like gaur, bear, tiger and panther from the study area.

Elephant is probably the most affected animal when habitat is disturbed. Fragmentation of habitat, herd composition, sex ratio and frequency were examined and compared to that in other populations. The similarity of the herds sighted indicate that the elephants move all over the area. The habitations on the western and northern sides as well as the Kalyanathandu hill chain restrict the movement of elephants. On the south-eastern side cultivations and habitations block the movement of elephants. There are only about a few kilometres of continuous forest available south of Kulamavu region. Nemerous habitations and villages dispersed through out the region also affect the movement of the elephants. The route taken by one of the herds show that human disturbance makes the elephants to change their route very often.

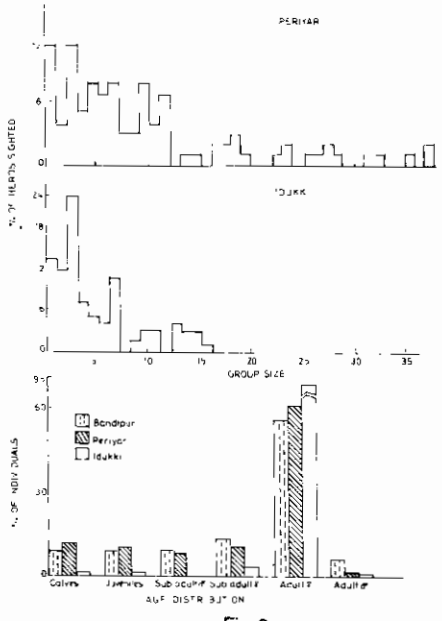


Fig:3
Herd size diagram and comparison.

The elephant herd size sighted varied from two to fifteen. Majority of the herds had less than 10 individuals in the group. In less disturbed populations as in Periyar herds of 30 or more individuals (Fig. 3) are common.

The Idukki pattern of smaller herds is characteristic of a highly disturbed population. The elephant population of the reserve is estimated to be around 75. Out of a total sighting of 321 individuals, 10.2% were solitary (Fig.4).

Fig:4
Solitary tusker

Groups exceeding 15 individuals were rare. Out of these, the males constituted only three individuals (0.93%). During the course of the study two different adult tuskers could be identified, one had asymmetric tusks. These elephants were sighted at Maruthumkanam and Kodayurutty. Male elephants in the subadult or juvenile categories were not observed. Among the female elephants there were 95% adults and 2.5% subadults. A distribution of the elephant dung size also showed few individuals in the smallest size category. The sex ratio is very much different from 1:1 found in healthy populations.

At Idukki, there were only a few elephants in the smallest size category. The sex ratio was very different from that of healthy populations.

These facts indicate that the elephant population at Idukki is in a state of decline. The elephants seem to

be confined to a limited area. All the surrounding areas are under cultivation. The only connection with any large chunk of forest is at Meenmutty.

There were only two sightings of sambar. Evidence of sambar, barking deer, hare and wild pigs were obtained from the sample plots. On a few occasions wild pigs were sighted. In many areas there were abundant signs of hare. The main carnivores noted were jackal and wild dog. Jackals were observed on a few occasions. There were only indirect evidence of wild dogs. Several cases of wild dogs attacking domestic goats and cattle were noticed. This unusual behaviour is probably due to the lack of wild prey. The Zoological Survey of India team has recorded three wild dogs poisoned by villagers. Tiger and leopard were not sighted.

Wild dogs lifting cattle is an unusual behaviour and probably is due to the lack of wild prey.

Bonnet macaque, the only primate in the area were sighted at Meenmutty, Kalamkamathi and near the Butterfly Valve Chamber (BVC). The troop size varied from few to about 40 individuals. The range of the monkeys was limited to a few square kilometres around each region. The monkeys also indulged in a great deal of crop raiding. Troops of bonnet macaques seen inside the forest were comparatively shy, their troop size was also smaller. The troop size of the bonnet macques seen in the BVC area were smaller than those found in other habitats. These monkeys have been displaced from the area when the work in connection with Idukki stage II and III commenced in early 1984. The wild pigs raid crops in cultivated areas and hence frequent reports appear about them.

The region has undergone many changes before and after the completion of the project. Some of these are human settlements, fire, cattle grazing, establishment of plantations and emergence of a township in the area. Shifting cultivators and cattle grazers set fire to the forest and the grasslands almost every year. Regeneration of trees were found to be severely affected due to fire. Burning of grasslands with Eucalyptus plantations are also of common occurrence. As in the case of other places near forest, people in the study area gather fuel wood from the forest. The presence of large number of staff quarters, tea shops, etc. have put a high demand on fuel. As a result of this, tree density is gradually on the decrease around the habitations.

The tree density is gradually on the decrease around the habitations.

The study area had a few tribal settlements. Traditionally they practised shifting cultivation. Many of the displaced tribals settled down in nearby forest areas rather than going to other regions. Persons evicted from the submerged areas were paid compensation, but most of these people moved and settled within 20 to 30 km radius. Many persons were reported to have migrated to forest areas above the maximum water level and settled there. Many of the workers who came in for the construction work also encroached forest and stayed over.

During the latter phases, because of the settlers' organizational strength and political backing, they were able to extract substantial compensation and resettled at the place of their choice adjacent to the developing township and civil station in the middle of the forest. About 200 ha. of forest was cleared for this purpose between Pynavu and Cheruthoni.

A decision to put up the headquarters of the Idukki district at Pynavu was taken, possibily to make use of the buildings constructed in connection with the Idukki project. This decision along with that of resettling people in the neighbourhood of the civil station had a more far reaching effect on the environment of this region compared to all other activities done in recent times. As a result of all these activities, a break in the forest continuity between Pynavu and Cheruthoni which is the only remaining connection with any large chunk of forest is developing.

Encroachment of forest in the vicinity of the project area continues unabated. The cultivators gradually annexe parts of adjoining forest to their cultivation by shifting the temporary boundaries and trenches.

The decision to put up district head quarters at Pynavu and resettling people in the neighbourhood of the civil station had a more far reaching effect on the environment of this region compared to all other activities done in recent times.

Encroachments, roads and plantations are found to be synergistic. A few important points need to be considered in future management of the sanctuary. Protec-

tion of the evergreen vegetation near the civil station, restrictions on leasing of forest for cardamom cultivation, extending limits of wildlife sanctuary and restriction of encroachment and development of township are the most important of them. Before going to the details we should bear in mind that the region has to a great extent been irrevocably damaged. The area does not have much scope for bringing back into conflict with what is already established. It may be more advantageous to have the residential quarters of staff near Idukki or Kulamavu rather than around Painavu. It can be seen that the civil station and resettlement area have made a break in the forest continuity already.

The only good patch of evergreen forest is located near Pynavu civil station. Cardamom cultivation has degraded most of the other parts. The sanctuary at present includes only degraded areas, mostly grassland and rocky areas. The portions between the Kulamavu -Idukki road and Idukki-Kattappana road should be included in the sanctuary. Idukki area is often cited as the only protected area in the Cardamom hills.

Idukki wild life sanctuary can serve as a habitat for endangered and endemic species of plants and animals only by adding more areas to it.

The objective of a wildlife sanctuary is to provide a habitat for endangered and endemic species of plants and animals. The Idukki Wildlife Sanctuary can serve this purpose only by addidng more areas and resorting to protection measures. Steps like introducing animals will have to be undertaken, The region, already a favourite tourist spot because of the dam and power house can offer facilities for viewing animals from boat. Thus the problems facing Idukki Wildlife Sanctuary, the isolated remnant of the Cardamom hills are diverse and challenging.

P. Vijayakumaran Nair
Divn. of Wildlife Biology

Know your information source

Indonesian Forestry Abstracts

Dutch literature until about 1960
Wageningen, Netherlands,
Centre for Agricultural Publishing and Documentation
1982.

Indonesian Forestry Abstracts consolidates Indonesian forestry literature upto 1960. In an effort to disseminate Forestry literature to young scientists, the Indonesian and Dutch governments made a joint venture to survey all available literature on forestry, scattered throughout the country in the form of journal articles, reports, books and unpublished records. Some of the old journals like 'Tectona' ceased publication and information users cannot have access to such journals. Indonesian Forestry Abstracts contains about 6000 entries. Each entry is provided with bibliographic details and an informative abstract in English. The abstracts contain most of the information available in original documents. As far as possible, latest scientific names are substituted in the abstracts. The Oxford System of Decimal Classification for Forestry (ODC) is followed for classifying the entries to broad subject groups. The reference of this bibliography is made easy by providing separate author, subject and species indexes.

There are several factors in common between the forests of India and Indonesia, floral and faunal composition, socio-economic considerations, etc. Therefore, Information about forests of Indonesia is useful for an Indian Forestry Scientist and the Indonesian Forestry Abstracts provide easy access to Indonesian forestry literature.

This monumental bibliographic guide is a practical demonstration of governmental patronage in the field of information retrieval. In India also there is ample scope for compiling such a bibliographic guide to provide access to forestry literature. India has a history of more than a century in forestry research and large number of publications are available in the form of journal articles, books, reports, unpublished papers, etc, scattered throughout the country. A comprehensive bibliographic guide to such literature is yet to be compiled.

K. Ravindran
Librarian

Meeting of the KFRI Research Advisory Committee.

The 12th meeting of the KFRI Research Advisory Committee was held in the Institute on 27 January 1990. The Committee was constituted by the State Government Vide GO Rt 176/77 Plg. dated 18-4-1977 with the Chief Conservator of Forests (Development) as its Chairman and Director, KFRI as Member Secretary. Members include Director of Research, Kerala Agricultural University; Principal, Forest College, Coimbatore and Senior Officers of the Kerala Forest Department.

The functions of the Committee are:

Advise the Institute on problems of applied value, for investigation.

Oversee general forestry research programmes in the state and allocate research problems to different organizations like Kerala Forest Research Institute, Kerala Agricultural University and Silvicultural Research Division of the Forest Department.

Ensure that there is no duplication of research effort by the different agencies in the state and organisations engaged in forestry research, and

Evaluate facilities to be offered by the Forest Department for field studies.

Dr. S. Chand Basha, IFS, Chief Conservator of Forests (Social Forestry & Planning), nominee of the Chief Conservator of Forests (Development) presided over the meeting. In the meeting which lasted the whole day Senior Scientists-in-charge of the 12 scientific divisions in KFRI viz, Silviculture, Soil Science, Genetics, Plant Physiology, Entomology, Pathology, Ecology, Botany, Wildlife, Biology, Economics, Statistics and Wood Science, presented highlights of the completed and ongoing research projects. Research results, its application to field situations and the needs and priorities in forestry research were disucssed. The Research on the following topics were recommended among others.

Management of overstorey tree species in Cardamom Plantations of Kerala Forest Development Corporation (KFDC) to ensure forest regeneration.

Use of bio-fertilisers in forestry.

Demonstration of appropriate taungya practices in forest plantations.

Estimation of yield from *Acacia auriculiformis* plantations raised under Social Forestry programme

Time series studies on demand and supply of wood in Kerala.

In addition to senior scientists from the Institute, the following members attended the meeting.

Dr. S Chand Basha, IFS, Chief Conservator of Forests, (Social Forestry & Planning)

Shri James Varghese, IFS, Managing Director, Kerala Forest Development Corporation, Kottayam and Chief Conservator of Forests, Vigilence.

Shri TK Raghavan Nair, IFS, Conservator of Forests, Central Circle, Quilon.

Shri M Govindan Kutty, IFS, Conservator of Forests, High Range Circle, Kottayam.

Shri K Sasidharan Nair, IFS, (Planning), Trivandrum

Shri K Achuthan, IFS, (Working Plan & Research Circle), Trivandrum.

Shri K Balachandran Thampi, IFS, Vested Forest Circle, Calicut.

Shri NV Trivedi Babu, IFS, Silvicultural Research Officer, Trivandrum.

Shri A Shetty, IFS, Divisional Forest Officer, Nilambur North Division, Nilambur (Representing Conservator of Forests, Northern Circle).

New Research Projects.

KFRI 127/89:

Studies on water use, assimilation and growth of eucalypts.

Investigators.

Jose Kallarackal
T. Surendran
Division of Plant Physiology

Objectives: The Project envisages to study canopy transpiration, stomatal control mechanism, percentage of interception, soil water availability throughout the year, rooting pattern, photosynthesis and growth in relation to water availability of eucalypts. The results will be helpful to know whether eucalypts consume more water than native species and how the growth and productivity of eucalypts are affected by water availability.

The project is financed by Ministry of Environment and Forests, Govt. of India.

KFRI 128/90:

Water use of selected indigenous and exotic trees

Investigators:

Jose Kallarackal
C.K. Somen
Division of Plant Physiology

Objectives: The major objectives are to study the stomatal control of water loss and photosynthesis of selected exotic and indigenous species. Also, canopy transpiration from plantations of *Acacia auriculiformis* will be estimated. The information will be useful to select suitable species for planting in different locations.

Sponsored by Social Forestry Wing of Kerala Forest Department.

KFRI 129/90:

Propagation of medicinal plants, bamboo and rattan by tissue culture methods.

Investigators:

Director/his nominees

Objectives: The project is intended to develop micropropagation methods for some medicinal plants, bamboos and rattan with particular stress on standardising the conditions for transferring plants produced in culture to the field.

KFRI 130/90:

Demonstration cum research on multitier forestry through operations research

Investigator:

U.N. Nandakumar
Division of Silviculture

Objectives: The Project envisages to establish a demonstration plot on multi-tier forestry by optimal use of available knowhow using appropriate Operational Research (OR) techniques.

Sponsored by Social Forestry Wing of Kerala Forest Department.

KFRI 131/90 :

Distribution of mammals and birds in Chinnar Wildlife Sanctuary and Eravikulam National Park

Investigators:

P. Vijayakumaran Nair
K.K. Ramachandran
P.S. Easa and E.A. Jayson
Division of Wildlife Biology

Objectives: To document the distribution of selected mammals and birds and the data can be used for preparation of conservation and management plans for Chinnar Wildlife Sanctuary and Eravikulam National Park.

KFRI 132/90:

Use pattern and chemical characterisation of the natural salt licks in Chinnar Wildlife Sanctuary

Investigators:

P. Vijayakumaran Nair
M. Balagopalan
K.K. Ramachandran
Division of Wildlife Biology and Soil Science

Objectives: To examine the degree of salt lick use by different animals during various seasons and to characterise the soils in salt licks as well as adjacent areas.

Seminars, Symposia and Workshops

National

Dr. A.R.R. Menon (Ecology) and **A.R. Rajan** (Statistics) attended the Regional Workshop on' Indian Remote Sensing Satellite IRS - IA) Mission and its Application Potential' in Trivandrum on 25 Sept. 1989.

Dr. S. Sankar (Soil Science) participated in the National Seminar on Socio-economic and Environmental Impact of Water Resources Projects organised by the CWRDM, Calicut, 30 Sept. - 1 Oct. 1989 and presented a paper entitled 'Impact of Hydroelectric Projects on Soils and Landuse.'

Dr.K.M. Bhat (Wood Science) attended a workshop on 'Development of standard white cane for the rural blind', at Louis Braille Memorial Research Centre, Bombay on 27th October 1989 and presented a paper entitled 'Property evaluation of selected timber and cane species for developing standard white cane for the rural blind'

Dr. K.M. Bhat (Wood Science), **Shri. M. Balasundaran, Shri. C. Mohanan and Smt. E.J. Maria Florence** (Plant Pathology) participated in the National Seminar on New Dimensions to Wood Science and Technology Research and Development, Bangalore, 3 - 5 November 1989. The following papers were presented .

Biodegradation of Rattans (C. Mohanan)

Decay of standing trees in Natural forests of Kerala (C. Mohanan)

Fungal biodeterioration of some commercially important timbers of Kerala and the efficacy of fungicides for its control (E.J.Maria Florence)

Laboratory evaluation of natural durability of lesser known and under utilised timber species of Kerala (M. Balasundaran)

Tuning the wood quality and anatomical research to users need in the context of changing pattern of wood supply (K.M.Bhat)

The present saw-milling technology in Kerala and the factors influencing lumber recovery (K.M. Bhat and P.K. Muraleedharan)

Dr. R. Gnanaharan (Wood Science) participated in a symposium on 'Timber for AD 2000' organised by Kerala Environmental Council in Cochin on 15 Nov. 1989, and acted as moderator.

Shri. E.A. Jayson (Wildlife Biology) attended the National Symposium on Recent Advances in Behavioural Sciences, Jaipur, 27-29 November 1989 and presented a paper 'Seasonal abundance of avifauna in Silent Valley National Park, Kerala'

Dr. R.V. Varma (Entomology) **Shri K.C. Chacko, Dr. R.C. Pandalal** (Silviculture) **Shri C. Mohanan, Shri M.I. Mohammed Ali** (Plant Pathology) and **Dr. K.K.Seetha lakshmi** (Plant Physiology) attended the National Seminar on Seed Technology, Institute of Forest Genetics and Tree Breeding, Coimbatore, 29-30 November 1989. The following papers were presented.

Impact of *Atteva fabriciella* feeding on seed production in *Ailanthus triphysa* (R.V. Varma).

Effect of seed dressing chemicals on spermoplane microflora of some important indigenous tree species of Kerala (M.I. Mohammed Ali and J.K. Sharma)

Seed Pathology in India - Present status, practical problems and future prospects. (C. Mohanan and J.K. Sharma)

Promising storage methods for Bamboo seeds (K.K. Seethalakshmi and C.K. Somen)

Shri. C. Mohanan and Shri M.I. Mohammed Ali (Plant Pathology) participated in the National Seminar on Casuarinas in India, Neyveli during 18-19 December 1989 and presented the following papers

Fungal diseases of Casuarinas in India - an over view (C. Mohanan and J.K. Sharma)

Bacterial Wilt disease of *Casuarina equisetifolia* -a new record from Kerala (M.I. Mohammed Ali and J.K. Sharma)

Dr.P. Vijayakumaran Nair and Dr. P.S. Easa (Wildlife Biology) participated in the Symposium on 'Ecology, behaviour and management of the elephants in Kerala' conducted by Kerala Forest Department in Trivandrum during 23-24 Feb. 1990 and presented the following papers

Interaction between elephants and teak plantations in Parambikulam Wildlife Sancutary (P. Vijayakumaran Nair and E.A. Jayson)

Status of elephants and management options in Parambikulam (P.S. Easa)

A conservation unit for Asian elephant in Kerala (P.S. Easa)

Dr. C. Renuka (Botany) participated in the seminar on 'Nursery techniques', at Madurai Kamaraj University during 1-2 February 1990 and presented a paper entitled 'Package of practices and nursery techniques for Rattans'

Dr. K.S.S. Nair (Director-in-Charge) **Shri.Thomas P. Thomas** (Soil Science), **Shri E.A. Jayson** (Wildlife Biology) and **Shri C.Mohanan** (Plant Pathology) attended the Second Kerala Science Congress, Trivandrum, 23 - 25 Feb. 1990.

International

Shri Mammen Chudamannil (Economics) participated in the 13th Commonwealth Forestry Conference, Rotorua, New Zealand during 17 Sept. to 4 Oct. 1989 and presented a paper entitled 'Investment policy and multiple use sustained yield forestry in Kerala, India'.

Dr. K. Swarupanandan (Ecology) participated in the Fourth Round Table Conference on Dipterocarps, Bogor, Indonesia, during 12-15 December 1989 and presented a paper entitled 'Seedling morphology and some contemporary thoughts on the phylogeny and circumscription of the family Dipterocarpaceae.'

Dr. P.S.Easa (Wildlife Biology) participated in the Workshop on 'Biology and Conservation of large Asian Mammals' organised by World Wide Fund for Nature from 28 Jan to 5 Feb 1990 at the Royal Chitwas National Park, Nepal.

TRAINING PROGRAMMES

Shri M.I.Mohammed Ali (Plant Pathology) attended a training course on 'Seed Pathology', in the Department of Applied Botany, Mysore University, Mysore, 15-22 Sept.1989.

Dr. K.V. Sankaran (Plant Pathology) attended a training course in 'Identification of Fungi of Agricultural Importance' and 'Identification of Bacteria' at the CAB International Mycological Institute, Kew, England from 25 Sept. to 17 Nov. 1989.

Smt. N. Sarojam (Library) attended a Training Course on 'Information Repackaging and Consolidation' at Asian Institute of Technology, Bangok during 15 Jan - 16 Feb 1990.

Shri K. Ravindran, (Library) attended a Training Course on 'Indexing and Abstracting' at the Agriculture Information Bank for Asia (AIBA), University of Philippines, Los Banos during 22 Jan - 9 Feb 1990.

Dr. A.R.R. Menon (Ecology) attended a workshop on Digital Image Analyis, 29 Jan - 10 Feb 1990, at the Regional Remote Sensing Service Centre, Bangalore.

MEETINGS, CONSULTATIONS AND GUEST LECTURES

Dr. K.S.S. Nair (Director-in-Charge) Dr.J.K. Sharma (Plant Pathology) and **Dr. R. Gnanaharan** (Wood Science) delivered guest lectures on Insect borers of timber and their control, 'Wood destorying fungi and their control' and 'Wood preservation' respectively to the trainees of Mechanical Wood Industries Technology Course, Indian Plywood Industries Research Institute, Bangalore on 28 Sept.1989.

Dr. P.S.Easa (Wildlife Biology) particiated in the Workshop on Vertebrate Ecology, Mudumalai, 4 November - 6 December 1989 as a faculty member.

Dr. R. Gnanaharan & Dr. K.M. Bhat (Wood Science) attended the Timber Sectional Committee Meeting of the Bureau of Indian Standards, New Delhi, 4-7 December 1989.

Dr. P.Vijayakumaran Nair attended the Nature camp, Periyar Tiger Reserve as a resource person on 11 Feb 1990.

KFRI Seminars

18 October 1989:	**Decomposition of forest litter and associated nutrient changes** **Dr. Jay Maheswaran** Dept. of Agriculture & Rural Affairs State Chemistry Laboratory, Melbourne Victoria 3002 Australia
25 October 1989:	**Watershed approach.** **Dr. K.M. Namboodiri** Action for Food Production Geohydrological Investigation Team 69, Valluvar Street, Tatabad, Coimbatore 641 012.
13 November 1989:	**Some aspects of integrated research in Entomology** **Prof. T.N. Ananthakrishnan** Director Entomology Research Institute Layola College, Madras.

18 November 1989: **Enneametric systematics and unified theory in biology.**

Dr. Antony Santiago
Plant Biologist
14, Lorong Kemaris
4 Bukit Bandaraya
Bangar, 591000 Kuala Lumpur
Malaysia

6 January 1990: **1.Planning protected area network in Western Ghats; 2. Forest management for wildlife.**

Dr. W.A. Rodgers
FAO Expert
Wildlife Institute of India
Dehra Dun

2 February 1990: **Palynology-aspects and prospects**

Dr. P.K.K. Nair
Kaul Science Foundation
National Botanical Garden and Research Institute,
Lucknow

8 February 1990: **Tree mycoplasma**

Dr. S.P. Raychaudhuri
Chairman,
IUFRO Working Party on Viruses
and Mycoplasma Diseases
Shivalik Apartments
Kalkaji, New Delhi 110 019.

15 February 1990: **Rattans and the rattan trade**

Dr. N. Manokaran
Forest Research Institute of Malaysia
Kepong, Selangor.

Forthcoming events

10-12 April 1990
International Conference on Global Warming
Chicago, USA.
Contact: Dr. Sinyan Shen
C/O SUPCON International
One Heritage Plaza
Woodridge IL 60517
USA Tel. 312/910 - 1551

5-8 June 1990
Education on Forest Genetics and Tree Breeding
Zvolen, Czechoslovakia
Contact: Dr. Ladislav Paule
Lesnicka Fakulta
VSLD, CS 96053
Zvolen, Czechoslovakia

11-15 June 1990
Research needs and Applications to reduce Erosion and sedimentation in tropical stepplands
Suva, Figi
Contact: Robert R. Zeimer
1700 Bayview Drive
Arcata, Ca 95521
USA

12-17 June 1990
International Conference on Conservation of Tropical Biodiversity
Kuala Lumpur, Malaysia
Contact: Persatuan Pencinta Alam, Peti Surat
10750,50724
Kuala Lumpur, Malaysia

22-27 July 1990
Wood structure as a tool for a better understanding of tree function and timber quality
Zurich, Switzerland
Contact: IAWA - IUFRO Symposium
P.O. Box ETH Zentrum
CH - 8092 Zurich
Switzerland

30 July-2 Aug. 1990
International Timber Engineering Meeting
Fredericton, New Brunswick, Canada
Contact: Preben Hoffmeyer
Building Materials Laboratory
Technical University of Denmark

Bygneng 118. DK 2800
Lyngby
Denmark

1-18 Aug. 1990

XIX IUFRO World Congress, Montreal, Canada.

Contact: Dr. David K.Lemkay
Secretary
Organising Committee
XIX IUFRO Congress
Box 1990, Montreal, Canada

31 Jul-2 Aug. 1990

Contribution to Biochemical Markers to the understanding of Population Genetics of Forest trees - Retrospects and Prospects

Corvallis, Oregon, USA.

Contact: Conference Assistant
College of Forestry
Peavy Hall, 202
Oregon State University
Corvallis, Oregon 97331-5707
USA.

28 Aug.-3 Sept.1990

Fourth International Mycological Congress.

Rosenberg, Federal Republic of Germany

Contact: Prof. A.Bresinsky
Botanisches Institut
der universitat, D-8400
Rosenberg, Federal Republic
of Germany
tel. (0941) 9433108
Telex 65658 unired

30-Aug. 1990

National Symposium on New Trends in Crop Improvement of Perennial Species

Kottayam, India 686 009.

Contact: Dr. M.R. Sethuraj
Director
The Rubber Research Institute
of India
Kottayam 686 009
Kerala, India

2-6 Sept.1990

Ecology of Mixed Species Stands of Trees.

Edinburgh, Scotland

Contact: M.G.R. Cannell
Institute of Terrestrial Ecology
Edinburgh Research Station
Bush Estate, Penicuik,
Midlothian, EH 26, OQB, Scotland

25-29 Sept 1990

Biological Nitrogen Fixation and Sustainability of Tropical Agriculture

Ibadan, Nigeria.

Contact: Dr.K. Mulongoy
IITA Oyo Road,
PNB 5320
Ibadan, Nigeria

Nov-Dec. 1990

Fodder Tree Legumes - Multipurpose Species for Agriculture

Queensland, Australia

Contact: Course Secretariat
Uniquest Limited
University of Queensland
St. Lucia
Queensland 4067
Australia

October. 1991

Integrated Forest Management Information Systems

Japan

Contact: Dr. M. Minowa
Department of Forestry
University of Tokyo
1-1-1 Yayoi, Bunkyoku
Tokyo, 113, Japan

Autumn 1991

Multi products Inventory of Tropical Mixed Forests

Tanzania

Contact: Dr. A.B.Temu
Faculty of Forestry
P.O. box 3013
Chuo kikuu, Morogoro
Tanzania

Campus news

Dr. P.K. Muraleedharan, Scientist D, Division of Economics proceeded to The Ohio State University, U.S.A. in October 1989 on a post doctoral fellowship under the Ford Foundation Grant to the Institute for a period of one year.

Sri. V. Asokan (Typist) was inducted as Key Board Operator and **Sri. M. Cherukunhan Nair** (Attender) as Skilled Assistant in the Bamboo Information Centre Project recently established in KFRI with financial support from International Development Research Centre, Canada.

Visitors

Dr. Jay Maheswaran 18 Oct. 1989
Dept. of Agriculture & Rural Affairs
State Chemistry Laboratory, Melbourne
Victoria 3002 Australia

Dr. Antony Santiago 18 Nov. 1989
Plant Biologist
14 Lorong Kemaris
4 Bukit Bandaraya
Banagar, 59100 Kaula Lumpur
Malaysia.

Dr. W.A. Rodger 6 Jan. 1990
FAO Expert
Wildlife Institute of India
Dehra Dun.

Drs. Daniel Wood Bromley
David Thruman Ford
David Wilber Guillet and
Charles Frederick Hutchinson 17 Jan. 1990
US Specialists team
USAID/INDIA

Drs. D.R. Chaffey
J. Paranjape 20 Jan. 1990
British Council Division
New Delhi

Sri. Goenkar, IFS 20 Jan. 1990
Chief Conservator of Forests
Karnataka

Dr. S.P. Raychaudhuri 8 Feb. 1990
Chairman, IUFRO Working Party
on Viruses and Microplasma Diseases
A-61 Alakananda
Shivalik Apartments
Kalkaji, New Delhi 110 019

Dr. I.V. Ramanuja Rao 12-15 Feb.1990
IRDC Bamboo-Rattan Network co-ordinator
University of Delhi

Dr. N. Manokaran 12-15 Feb. 1990
Forest Research Institute of Malaysia
Kepong, Selangor
Malaysia

Prof. Craig B. Davis 20 Feb. 1990
School of Natural Resources
Ohio State University
USA

Prof. Arnold G. Van der Valk 20 Feb. 1990
Lowa State University
Ames, Iowa.

OBITUARY

Sri. T.G. Sankarankutty who had been working in the institute as office assistant for more than seven years since 1979 passed away on 19 January 1990.

We convey our heartfelt condolences to the bereaved family and pray that his soul may rest in peace.

ERRATTUM

In the previous issue of EVERGREEN (No. 23 Sept, 1989) there are some changes in the names of tree species reported in the article 'Gale hit KFRI Campus' (Page 8) We regret for the inconvenience caused. It may be kindly read as given below:

S No.	Species
2	*Dalbergia sissoides* (Rose Wood)
6	*Terminalia crenulata* (Karimaruth)
9	*Terminalia paniculata* (Maruthu)
20	*Dillenia pentagyna* (Kodapunna)
17	*Pterocarpus marsupium* (Venga) in addition to the number given in the table one more tree was found broken in the girth class 91-120 cm
12.	*Bischofia javanica* may be deleted.