

ESTIMATES COMMITTEE (1964-65)

SEVENTY-EIGHTH REPORT (THIRD LOK SABHA)

**MINISTRY OF FOOD AND AGRICULTURE
(Department of Agriculture)**

**FOREST RESEARCH INSTITUTE AND COLLEGES.
DEHRA DUN**



**LOK SABHA SECRETARIAT
NEW DELHI**

April, 1965

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CORRIGENDA

to

Seventy-eighth Report of the Estimates
Committee on the Ministry of Food and
Agriculture (Department of Agriculture)
- Forest Research Institute and
Colleges, Dehra Dun.

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Page 1, para 1, line 24, for 'tress'
read 'trees'

Page 4, para 9, lines 8-9, for '1947-58'
read '1947-48'

Page 7, para 18, lines 5-6, delete "or
Principal in view of it having three
colleges".

Page 18, para 32, for 'Prof. M.V. Launie'
read 'Prof. M.V. Laurie'

Page 18, para 32, last line, for 'forests'
read 'forest'

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(1964-65)

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* Elected w.e.f. 18th September, 1964, vice Shri Lalit Sen ceased to be a member of the Committee on his appointment as a Parliamentary Secretary.

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INTRODUCTION

I, the Chairman, Estimates Committee having been authorised by the Committee to submit the report on their behalf, present this Seventy-eighth Report on the Ministry of Food and Agriculture (Department of Agriculture)—Forest Research Institute and Colleges, Dehra Dun.

2. It would be recalled that the Estimates Committee for 1952-53 and 1953-54 had examined the estimates of the Ministry of Food and Agriculture and presented the Sixth Report (November 1953) which *inter-alia* dealt with the Forest Research Institute and Colleges. Action taken by Government on the recommendations contained in the above Report was examined by the Estimates Committee (1956-57) who presented the Fifty-Second Report (March 1957) on the subject.

3. The Committee took evidence of the representatives of the Ministry of Food and Agriculture (Department of Agriculture) on the 23rd December, 1964. The Committee wish to express their thanks to the Secretary, Ministry of Food and Agriculture (Department of Agriculture), President, Forest Research Institute and Colleges, and other officers of the Ministry for placing before them the material and information they wanted in connection with the examination of the estimates.

4. The Report was considered and adopted by the Committee on the 27th March, 1965.

5. A statement showing the analysis of recommendations contained in the Report is also appended to the Report (Appendix VII).

NEW DELHI;

ARUN CHANDRA GUHA,

April 9, 1965.

Chairman,

Chaitra 19, 1887 (Saka).

Estimates Committee.

INTRODUCTORY

A. Introduction

Forests constitute an important source of natural wealth of the country. They are the source of many kinds of timber which subserve the requirements of the building industry, of defence and communications as well as of an expanding range of industries in which wood forms the principal raw material. They are also the source of fire-wood and of small timber required by rural communities. Apart from these direct benefits, forests perform a vital function in protecting the soil on sloping lands from accelerated erosion by water and on flat lands from desiccation and wind erosion. In the catchments of the rivers, they serve to moderate floods and to maintain stream flow. They have an important ameliorating influence on climate. Trees act as pumps, tapping the ground water from considerable depths and transferring it as moisture to the air, thus increasing humidity. The sudden change in the climate of many parts of India is largely due to indiscriminate destruction of forests. The protective benefits of forests are fully realised when forests extend over sizeable tracts, but even scattered trees and clumps of tree growth exercise beneficial influence. Properly disposed shelter belts and wind belts serve to increase agricultural yields to a marked extent. For an agricultural country like India, the importance of forests and trees can hardly be exaggerated. The Puranas have rightly said that "one tree is equal to ten sons".

2. The forests of India as they exist today are the remnants of very large forests which in the distant past covered the entire surface of the country. India is essentially a forest region and the Indian climate a forest climate, except for some very arid regions of Rajasthan, the stretches of saline soil bordering the Rann of Cutch, the wave-washed sandy beaches along the coast, the snow-clad peaks of Himalayas, and the rocks and boulders of the wind swept higher elevations.

3. Forests of the various types are today confined to the hilly tracts and to poor soils. Some forests still remain on broken and undulating ground which was found to be too infertile for agricultural crops; but these have undergone severe maltreatment at the hands of the population who live around the margin and often within the forest itself.

The hill forests also did not escape human attention and interference. Although the population inhabiting the hill fastnesses were small, their continuous activity over many centuries has reduced the density of tree growth, sometimes substituting bamboos or grasses for regular tree species. It is mainly in the Andaman and Nicobar Islands that one may still see what truly deserves the appellation of "virgin forests", which deserve some special study.

4. Certain kinds of produce of the forests of India were well-known outside the limits of the South-Asian sub-continent even in very early times. Long before the advent of the British, rosewood, satinwood, teak, ebony and Sandalwood were regularly exported to Arabia, Persia and other western markets. Indian teak was used by Arabs for building their once powerful fleet which used to sail the Arabian Sea, the Bay of Bengal and other parts of the Indian Ocean. The exploitation of the forests was in many cases far from organised. The timber merchants or the local population were free to take away from the forests whatever they liked and in any manner that suited their convenience so long as they paid the fee prescribed for the produce. The owners were interested only in collecting the revenue from the forest workers but did not pay any attention to the well-being of the forest itself. However, a regular forest policy and planned administration of forests came into being long after the British obtained a firm foot-hold in this country, for the British were, to begin with, more interested in revenue and trade. The first prompting towards forest administration came by way of anxiety regarding the dwindling supplies of teak used as a good substitute for their own ship-building oak timber. Although steps were taken to raise teak plantations during the 1840's, it was not till well after the middle of the 19th century that the idea of forest conservation took concrete shape in India.

5. The total forest area of the country is 784,558 Sq. Km. (302,918 Sq. miles) which is 24 per cent of the land surface. The National Forest Policy lays down that "India as a whole should aim at maintaining one-third of its land under forests."

B. History of the Institute

6. In 1855, Lord Dalhousie issued a memorandum for setting up of a forest organisation to ensure scientific management of forests and proper supply of timber. In pursuance of that policy, Dr. D. Brandis was appointed as the first Inspector General of Forests in 1864 to advise the Government of India on its forest policy.

7. Superior appointments to the forest departments of the erstwhile British provinces were regularly filled in by foreign trained officers of the Indian Forest Service; recruitment to the subordinate ranks was confined to Indian personnel, for whose training the Government of United Provinces (now called Uttar Pradesh) started a school at Dehra Dun under the aegies of the Survey of India in 1878, which in course of time has grown into the present Forest Research Institute and Colleges. In 1884, this Institute was transferred to the Central Government for the training of Rangers and was designated as Imperial Forest College.

The first research post (Zoologist) was sanctioned in 1900 for a period of two years, and a regular research department was added to this College in the year 1906 with five research Branches, namely, (1) Silviculture, (2) Zoology, (3) Botany, (4) Chemistry, and (5) Economics.

The Institution was renamed as Imperial Forest Research Institute with the head of the Institution designated as the President.

8. A separate training course for the Provincial Forest Service was started in 1912 which was discontinued in 1926 when the Indian Forest Service course commenced. The latter course was also discontinued in 1932 and was substituted by a new course in 1938 for the gazetted officers of all the provinces. This course, as also that of Forest Rangers, are still continuing.

9. On the research side, the Institute underwent considerable expansion as a result of two reorganisation schemes following each of the two World Wars. In 1920-21, soon after the First World War, the Economics Branch was split into 6 sections, namely, Timber Mechanics, Wood Seasoning, Wood Preservation, Cellulose and Paper, Wood Technology, and Wood Workshop, in view of greater importance which timber utilization attained. In 1947-58, most of the sections became independent research Branches and two new Branches e.g., Publicity and Liaison Branch and Statistical Branch were formed. In 1950 there was further reorganisation when some Branches were further split up making a total of 15 Branches and the post of Registrar and Director of Forest Education came into being. In 1952-53, a separate Timber Engineering Branch was created, thus raising the total number of Branches to 16.

10. In 1957 on the recommendations of the Champion Committee, the Branches were grouped under 8 Divisions *viz.*—

- (1) Mechanical Technology
- (2) Chemical Technology
- (3) Forest Botany
- (4) Forest Protection
- (5) Seasoning and Preservation
- (6) Forest Education
- (7) Forestry Research
- (8) Central Services.

In addition, two Regional Research Centres were established one at Bangalore in 1958-59, and the other at Coimbatore in 1959-60.

11. In 1962-63, the research Branches at Dehra Dun were regrouped into the following four Directorates in place of the Divisions, for better co-ordination:

- (a) Forestry Research
- (b) Biological Research
- (c) Forest Products Research
- (d) Forest Education.

II

ORGANISATION AND FUNCTIONS

A. Organisation

12. The Forest Research Institute and Colleges are under the administrative control of the Ministry of Food and Agriculture (Department of Agriculture) with the administrative head designated as the President.

13. The Forest Research Institute and Colleges have at present two main wings viz., (1) Forestry Education and (2) Research in forestry, biological sciences and forest product utilisation.

14. The forestry education is conducted in the following Colleges:

- (1) The Indian Forest College at Dehra Dun.
- (2) The Northern Forest Rangers College at Dehra Dun.
- (3) The Southern Forest Rangers College at Coimbatore.

The Indian Forest College runs a two year diploma course for training probationers selected for appointment as Forest Officers in the various States of the Indian Union. The Northern Forest Rangers College and the Southern Forest Rangers College impart training to Rangers of the States of Northern and Southern regions of the Indian Union respectively. This certificate course is also for two years.

The educational activities of the three Institutions are co-ordinated by the Director of Forest Education under the overall control of the President, Forest Research Institute and Colleges.

15. Research work on forestry, biological sciences and utilisation of forest products is carried out in the follow-

ing Directorates with a number of Branches grouped under each as stated below:—

I. Directorate of Forestry Research

1. Silviculture Branch
2. Logging Branch.

II. Directorate of Biological Research

1. Minor Forest Products Branch
2. Botany Branch
3. Entomology Branch
4. Pathology Branch
5. Wood Anatomy Branch

III. Directorate of Forest Products Research

1. Wood Seasoning Branch
2. Wood Preservation Branch
3. Timber Engineering Branch
4. Timber Mechanics Branch
5. Chemistry of Forest Products Branch
6. Cellulose and Paper Branch
7. Composite Wood Branch

16. There is also a Publicity and Liaison Branch for publicising the research activities of the Institute and disseminating the results of the research to the industries and the public. It maintains liaison with State Forest Departments, industrial organisations and allied scientific institutions in the country and abroad. The Statistical Branch tabulates and analyses data and helps the research branches of the Institute and State Forest Departments in the laying out of experiments. There is also a Service Branch for maintenance of all machinery and equipment and their installation. The above three branches are directly under the control of the President, who is helped by a Registrar in administrative matters and also by an Accounts Officer and a Stores Officer.

17. Besides the Central Institute at Dehra Dun, there are two Regional Research Centres, one at Bangalore and the other at Coimbatore, which deal with the problems which are specific to the Southern Region.

A chart showing the organisational set up of the Institute is given at Appendix I.

18. The Committee feel that the designation of the head of the Forest Research Institute and Colleges viz., President is not quite appropriate and suggest that it may be changed to 'Director' to conform to the designation of the heads of most of the research institutes in the country or 'Principal' in view of it having three Colleges. Consequential changes in other designations in the Institute may also be made.

B. Functions

19. The main functions of the Forest Research Institute and Colleges are as follows:—

- (i) to carry out research work on various problems relating to forestry, forest biological sciences and utilisation of forest products;
- (ii) to establish liaison with State Forest Departments and other industrial departments on forest wealth;
- (iii) to disseminate results of the research of the Institute through publications, seminars, exhibitions and other special demonstrations, etc.;
- (iv) to advise various Government Departments on matters relating to forestry and utilisation of forest products;
- (v) to impart specialised training to various types of technicians required for forest based industries;
- (vi) to give short courses of instructions to representative of other Government Departments in the utilisation of timber;
- (vii) to train forest officers and rangers for various State Forest Departments; and to function as Food & Agriculture Organisation training and educational centre for forestry and forest research for South East Asian region.

The Committee have been informed that the Institute undertakes both fundamental and applied research.

C. Declaring Forest Research Institute and Colleges as a University

20. The Committee understand that there is a proposal under consideration for according university status to the Forest Research Institute and Colleges as has been done in the case of Indian Agricultural Research Institute. They have been informed by the Ministry that the advantages of declaring the Forest Research Institute and Colleges as a university will be as follows:—

- (1) It will help to strengthen the present forest education facilities not only by improving the educational standards at degree level by permitting research facilities to the teachers but also by providing facilities and opportunities for specialisation and research.
- (2) The award of degrees in forestry on the pattern in vogue in other countries in the world will help in utilisation of opportunities to work for higher degrees in other countries enabling exchange of knowledge.
- (3) The status of Forest Research Institute and Colleges will be enhanced in international fields and they will be able to attract a larger number of foreign students.
- (4) Teachers and research workers in the Institute will develop a tendency to acquire knowledge and degrees in allied fields leading to a better efficiency.
- (5) The step will bring the country in line with other countries advanced in the field of Forestry Education and Research.

Keeping in view the professional requirements of the Forest Services and for the reasons stated above, the Committee have no doubt that the question of according Forest Research Institute and Colleges status of a university would be considered in the background of the general policy of the University Grants Commission and Government in the matter of giving such status to educational institutions.

D. Setting up of Regional Research Centres

21. The Committee note that the National Forest Policy of India lays down that the maintenance of a forest research organisation in each State commensurate with its resources and requirements is in the interest of efficient forest management of the country as a whole. It has been stated during evidence that in all States there are a State Silviculturist and his staff to carry out certain aspects of the research. Besides there are two Regional Research Centres, one at Bangalore and the other at Coimbatore. The Government of India are considering the establishment of similar research Centres at Gauhati and Jabalpur for which a sum of Rs. 50 lakhs was allocated during Third Five Year Plan; but they have not yet come to a decision as to establishing one research centre in each State.

The Committee think that if the research problems of forests of all regions, particularly of Assam and Madhya Pradesh which have rich resources of teak and other valuable wood, are to receive close attention, it is essential to establish Regional Research Centres which may serve as feeder and extension points for the Forest Research Institute. It may also be considered whether a Regional Centre can be set up in the Andamans where there are really "virgin forests". They hope that an early decision will be taken in the matter.

E. Schemes for Forest Research and Budget

(a) Financial Provision for Development of Forestry during Third Plan.

22. The Committee note that in the Third Five Year Plan, it was proposed not only to intensify some of the programmes initiated in the earlier plans but also to lay special emphasis on measures necessary to meet the long term requirements of the country for timber and other forest products. The immediate objective was to increase the output from the forests through raising plantations of economically valuable species including wood for industrial use and fuelwood, to improve logging techniques, develop and improve communications in forest areas and to bring about better utilisation of forest products through the increased use of timber seasoning and preservation processes.

23. Based on the scope and capacity of the forest organisation to undertake various schemes during the Third Plan period, an outlay of Rs. 117 crores was proposed for forest development. But owing to limitations of financial resources this outlay was reduced to Rs. 70 crores, to fit in with the overall ceiling of Rs. 1,000 crores allotted for the Agricultural Sector. Subsequently, this amount was further reduced to Rs. 52 crores. This comprised Rs. 44.72 crores for State Schemes, Rs. 3.62 crores for Central Schemes and Rs. 2.75 crores for Centrally Sponsored Schemes.

The expenditure by the end of the Third Plan is expected to be approximately Rs. 49 crores resulting in a shortfall of approximately Rs. 3 crores. This shortfall is stated to be partly due to the failure of the State Governments to provide funds in the first three years of the current Plan.

The Committee have been informed that in most of the important schemes the physical and financial targets are expected to be achieved except in the Scheme on Farm Forestry where due to inadequate incentives very slow progress has been made and in some States even the scheme has been held in abeyance.

The Committee feel concerned at the anticipated shortfall of Rs. 3 crores in expenditure on forest development in the Third Plan even against the reduced provision of Rs. 52 crores and suggest that every effort should be made to implement important schemes for forest development according to the time schedule. The scheme on Farm Forestry may be reviewed and remedial action taken to speed up forest development.

(b) *Third Plan Provision for Forest Research Institute and Colleges*

24. A sum of Rs. 155 lakhs was allocated during the Third Five Year Plan for schemes of development pertaining to the Forest Research Institute and Colleges. The Committee have been informed by the Ministry that this Plan allocation has recently been revised to Rs. 90 lakhs by them. The expenditure during the years 1961-54 is

Rs. 3.68 lakhs excluding the cost of construction of buildings during 1963-64 which is being done by the Central Public Works Department out of the funds allotted under the scheme. The total expenditure is not likely to exceed Rs. 26 lakhs for the Plan period. This abnormal shortfall is said to be due mainly to the late implementation of the schemes and to the delay in the setting up of the two Regional Research Centres at Jabalpur and Gauhati, at Rs. 25 lakhs each. As a result of the Emergency also, a number of other schemes which were proposed for the Third Plan had to be kept in abeyance.

The Committee are distressed to find that only such a small amount has been utilised in the first three years of the Plan and that the anticipated expenditure for the entire Plan period is expected to be only Rs. 26 lakhs against the Plan allocation of Rs. 90 lakhs. This indicates that Plan provision was not made on realistic basis and that schemes were not drawn up or implemented in time. The Committee are surprised that when the scarcity of forest resources is admitted on all hands and the need for research widely recognised, so little of the plan provision should have been put to effective use to intensify research.

The Committee would suggest that the causes for the delay in the implementation of the planned schemes should be carefully gone into and remedial measures taken to avoid such recurrence in future. They would also stress that Government should now take urgent measures to speed up implementation of planned schemes which are considered useful, to the maximum extent possible, during the remaining period of the Plan.

It should also be ensured that in the Fourth Five Year Plan, development of Forest Research Institute does not suffer on account of its poor performance in the current Plan period.

(c) Budget Estimates of the Institute

25. The budget estimates of the Forest Research Institute and Colleges for 1964-65 are as follows:—

	Rs.
Forest Research Institute and Colleges, Dehra Dun	41.84,000
Forest Research Laboratory, Bangalore	2,16,200
Southern Forest Rangers College and Research Centre, Coimbatore	4,23,600
Grant to Indian Wood Preservers' and Dyers Association	1,000
Charges in England	24,000
	<hr/>
TOTAL	48,48,800
	<hr/>

III

ADMINISTRATION

A. Administrative Set-up

(a) *Court of the Forest Research Institute and Colleges*

26. The responsibility for laying down the policy and programme of the Institute and for giving general directions and guidance for its working has been entrusted to a representative high-powered body known as the "Court of the Forest Research Institute and Colleges", with the Minister for Food and Agriculture as its Chairman. So far as the administration and working of the Institute are concerned, the Court is assisted by an official Executive Council, consisting of five persons who are members of the Court. The Court ordinarily meets once in six months. The Executive Council is required to meet as often as necessary but in practice it meets once in three months. The functions and composition of the Court and the Executive Council are given in the Resolution, a copy of which is at Appendix II.

(b) *Advisory Board of Research*

27. A Central Advisory Board on Forest Utilisation was set up in 1939 with a view to stimulating wide interest in the activities of the Forest Research Institute and ensuring closer and more active liaison between forest research and industry. This Board had been finalising research programme of the Institute for every quinquennium.

28. As a result of the constitution of the Court of Forest Research Institute and Colleges in November, 1961, it became necessary to review the composition and functions of the Central Advisory Board on Forest Utilisation to avoid overlapping of functions between the two bodies. As a result of the review, the Central Advisory Board on Forest Utilisation was renamed in July, 1963 as "Advisory Board of Research" with the following functions:

(a) to advise on—

(i) the general policy of research in the sphere of forestry; and

- (ii) assignment of priority to various items of research conducted at the Forest Research Institute and Colleges;
- (b) to co-ordinate research with the need of industry, agriculture and general public;
- (c) to forge a link between the producer and consumer of research;
- (d) to examine the quinquennial research programme of the Forest Research Institute and other cognate matters and to evaluate annually the progress of research;
- (e) to examine inventions and discoveries in the field of forest research and allied subjects- with a view to—
 - (i) assess the value of inventions/discoveries in the field of forestry research through pilot plants and in cooperation with the State Governments and the industry;
 - (ii) examine the feasibility of taking of patents for results of research; and
 - (iii) determine the scope of commercial possibilities in the discoveries and results of research in forestry.
- (f) to devise ways and means to bring the research workers of the Forest Research Institute in closer touch with practical problems of industry; and
- (g) to maintain closer liaison between the Forest Research Institute, the State Forest Departments, Industry, other scientific organisations and the public in general.

The composition of the Advisory Board of Research is given in Appendix III. The term of members other than *ex-officio* is three years. The Board meets once a year.

B. Latest administrative measures for improving the working of the Institute

29. The Committee have been informed by the Ministry that experience had shown that the various branches at the Forest Research Institute were functioning in water-tight

compartments and that instead of concentrating on actual research, the Research Officers were spending much of their time in administrative and financial matters. The following decisions were, therefore, taken by Government in 1963 in order to effect improvement in the working of the Institute:

- (i) The Technical Officers in the various branches of the Forest Research Institute should not do any administrative and financial work. Such work should be centralised at one place for the Institute as a whole. Separate offices at present functioning in the various branches for dealing with administrative and financial work (including procurement of stores) should be abolished and this work taken over by the Registrar who will function directly under the President.
- (ii) The Registrar should not ordinarily take any decision relating to a Directorate without the concurrence of the Director concerned. In the rare event of any recommendations of the Director not being found acceptable, the orders of the President Forest Research Institute should be obtained.
- (iii) While Directors would determine the need for purchase of stores, equipment and scientific instruments, the actual purchase work should be centralised and done by the Registrars assisted by the Stores Officer in accordance with the rules on the basis of requirements.
- (iv) No branch need maintain separate files of its own on administrative and financial matters. Official or demi-official correspondence between officers and branches of the Institute should as far as possible be avoided.

30. Under the reorganised set up, there are four Directors at the Forest Research Institute to assist the President. They are:

- (i) Director, Forest Education.
- (ii) Director, Biological Research.

(iii) Director, Forest Research.

(iv) Director, Forest Products Research.

The functions and powers of the four Directors in regard to technical matters have been laid down as follows:

(1) Functions

- (a) Planning of research, its allocation, promotion, co-ordination, collation and general supervision.
- (b) Promotion of collaborative work both inside and outside the Institute and association with Universities and technical Institutes in India and in foreign countries. Consultation with foreign countries.
- (c) Technical information service and maintenance of files regarding such information.
- (d) Publications of all kinds including reports, scientific publications and those for the general public in collaboration with the Publicity and Liaison Officer and under intimation to the President.
- (e) Tours of staff.
- (f) General control of the museums.

(2) Powers

The Directors will exercise the powers in different fields as follows:

- (i) Before finalising the quinquennial research programme, each Director will scrutinise the programme of the branches under him in relation to other programmes and effect such modifications as may be necessary to achieve the maximum coordination among them.

The Directors shall consult each other in order to evolve the maximum co-ordination and a balanced programme, for the Institute as a whole, before submitting it jointly to the President for approval.

The same procedure will be followed for annual programme except that they will be approved by the Directors themselves while being shown to the President for his information.

- (ii) Research reports and other reports in connection with the Third Five Year Plan Schemes will be complied by the respective Directors in respect of the Branches under him.
- (iii) Publications of all kinds including reports, scientific publications, and those for general public, are to be scrutinised and vetted by the respective Directors before they are submitted to the President, Forest Research Institute and Colleges for approval.

31. The Committee have been informed that the advantage of the revised arrangement is that the Directors in charge of research and training are not encumbered with matters of minor administrative nature and can concentrate on their main task of research. It has also been stated that the arrangement is being tried on a trial basis before being placed on permanent footing.

The Committee hope that the revised set-up of the Forest Research Institute has made for better coordination and administrative efficiency. They would, however, like to stress two aspects which had also been mentioned by the Expert Committee on the Forest Research Institute and Colleges in 1956, namely, that effort should be made to integrate the activities of the various Branches of the Institute and that there should be close link between forest research and education. The Committee would also stress that while liaison with the industry should be maintained, the Executive Council of the Forest Research Institute and Colleges which includes amongst others the Inspector General of Forests should at the same time take particular care to ensure the practical forest character of research work and the efficient conduct of the forestry courses.

Committee's Views.

C. Constitution of Second Expert Committee

32. The Committee note that in pursuance of a recommendation made in their sixth Report (1953-54) that steps should be taken to appoint a Board of eminent scientists

Periodical review of activities.

and representatives of the Industry to conduct periodically say every 3 or 5 years, an 'Achievement Audit', an Expert Committee under the Chairmanship of Prof. H. G. Champion, was constituted in January, 1956 to go into the working of the Forest Research Institute and Colleges. The Expert Committee submitted its report in April, 1956. They further note that a Second Expert Committee for the forest Research Institute with the following composition and terms of reference has been set up which will start functioning in March, 1965:

(i) *Composition*

1. Professor M. S. Thacker, Member, Planning Commission.	Chairman
2. Shri Hari Singh, Inspector General of Forests.	Member
3. Professor M. V. Launie, Professor of Forestry, Department of Forestry, Commonwealth Forestry Institute, University of Oxford.	Member
4. Dr. G. P. Kane, Deputy Director General, Directorate General of Technical Development, Ministry of Industry.	Member
5. Professor, P. Maheshwari, Head of the Department, Department of Botany, University of Delhi.	Member

(ii) *Terms of Reference*

- (a) to review the progress of research done at the Forest Research Institute during the past eight year (since the appointment of Expert Committee in 1956) and to make an assessment of research with a view to determining its usefulness in relation to extension of work;
- (b) to study the organisation of the Forest Research Institute (including the regional research centres at Bangalore and Coimbatore) and to suggest improvements;
- (c) to study the staffing position of the Institute, viz. whether the Institute is over-staffed or

provided with staff which is not of the right calibre;

- (d) to study proposals for improving the quality and progress of research;
- (e) to advise on steps to be taken for ensuring efficiency in the conduct of investigations;
- (f) to advise the lines of work which could be adopted in future having regard to technical personnel, equipment and financial resources available to the Institute;
- (g) to advise on steps to be taken for establishing liaison with other research institutions so as to derive advantage from their work and avoid duplication of research; and
- (h) to advise on steps to be taken to secure publicity and quick application of the results of research.

The Committee are constrained to observe that the Second Achievement Audit Committee has been set up after lapse of eight years although the recommendation of the Estimates Committee was for the appointment of "a Board say after three or five years". If the Achievement Audit Committee had been set up three years, earlier, Government would have had at their disposal its advice before effecting reorganisation of the Institute into four Directorates in 1963. The Committee hope that the Achievement Audit Committee would now go into the working of the revised set-up and suggest what further measures, if any, are necessary to bring about closer co-ordination between the various Directorates engaged in forests research, and more efficient administration.

IV

FOREST RESEARCH AND ITS UTILISATION

A. Research on raw material and technology for making pulp

33. The manufacture of paper from bamboo was a pioneering work of the Forest Research Institute. Since then a large number of other raw materials have been tested for the manufacture of various types of paper.

The Committee note that the paper industry has so far been using mostly bamboo and conifers as their raw materials for the production of pulp and paper. These are however available only in limited quantity in the forests. The production of pulp and paper in the country at present is only half a million tons. This is expected to be doubled in the Fourth Five Year Plan. The need for cellulosic raw material will therefore be very great in the years to come. The Committee understand that the cost of indigenous raw material for paper industry is at present very high as compared to that available in the U.S.A. It has been stated that alternative raw materials like hard-wood, bagasse and grasses are being tried out.

The Committee learn that while making applications for establishment of paper industry, requests are made for collaboration with foreign firms. One of the terms of collaboration is providing technical 'know-how' for converting raw material into pulp. The representative of the Ministry has stated during evidence that the Forest Research Institute is now largely operating in the field of finding suitable raw materials and making recommendations for using them for the paper industry.

The Committee cannot over-emphasise the vital need for conducting research on the technology for making pulp from different raw materials and suggest that this should be accorded a high priority.

The Committee feel that if the paper industry has to expand, it is imperative that researches on the suitability

of unconventional raw materials are carried out with missionary zeal. Indian forests contain large quantities of hard woods and concentrated research on the use of hard wood species for manufacturing pulp and paper will greatly help to meet the requirements of the future expansion of the industry.

34. It is understood that the Court of the Forest Research Institute had appointed in May, 1963 a Sub-Committee under the Chairmanship of Shri Thirumala Rao, M.P. to examine the working of the Paper Plant of the Forest Research Institute and Colleges. The Sub-Committee has since submitted its report to Government which is under their consideration. The main recommendations made by the Sub-Committee are summarised below:

- (i) The Cellulose & Paper Branch should be separated from the Forest Research Institute and raised to the status of an independent National Research Institute for undertaking research on all problems of Paper Industry.
- (ii) The Paper Plant should be used primarily for training and research, the idle capacity being used for production of paper required by Government as also special variety of paper required by Government Departments.
- (iii) The staffing position should be improved in accordance with the requirements of the Plant.
- (iv) The capacity of Pulping Unit should be raised to 6 tons a day to match the capacity of the Paper Mill.
- (v) The Voluntary Cess at present being paid by the Paper Industry should be increased to Rupee one per ton of paper produced by the Industry and should be made a compulsory cess by making it statutory.

The Committee hope that the question of raising the Cellulose and Paper Branch to the status of an independent National Research Institute would be carefully considered by the Government in consultation with the Paper Industry and others concerned before any final decision is taken.

The Committee would, however, stress that early action may be taken by Government to make the paper pulp plant an economically viable unit and to see that any surplus capacity, after training and research is properly utilised in productive purpose particularly for production of paper required by the Institute and other Government Institutions and Departments.

35. Regarding the staffing position, the afore-mentioned Sub-Committee has observed as follows in their Report:

"The various reports on the Paper Plant and our discussions with the Paper Industry have brought out clearly the need for improving the staffing position of the Cellulose and Paper Branch. Mr. John R. Fanselow, Pulp and Paper Consultant has reported that the staff of the Cellulose and Paper Branch must become sensitive to the needs of the Pulp and Paper Industry in India. The industry will not come to the Institute unless it finds that it can be helped by that contact. The technical staff of the Branch could not train men for the industry if it was not conversant with the practical and operational features of a production mill. In our discussions with the Paper Industry, it was brought to our notice that the Forest Research Institute has all the facilities and equipment necessary to make it a centre for the training of technical personnel for the Paper Pulp Industry, but such training would not be possible so long as the technical staff of the Cellulose and Paper Branch were not conversant with the practices and operational features of a Production Mill and consequently unable to approach the different technical problems of the Industry in a realistic and practical manner.

The Committee wholeheartedly agree that if the Cellulose and Paper Branch is to serve any useful purpose it should be sensitive to the needs of the industry and inspire confidence in its technical ability. The staff should be fully conversant with the operational features of Production Mill so that they can approach the problems of the industry in a realistic manner and can render useful assistance to them.

B. Improved process for treatment of bamboo

36. The Committee understand that an improved process has been evolved by the Forest Research Institute for the treatment of bamboo to further its utilisation in the manufacture of pulp, paper, board or the like. It has been stated during evidence that one firm had been examining the possibility of using the process but the Ministry are not aware of the ultimate outcome.

The Committee consider that the practical application of research processes evolved in the Institute is of crucial importance. The Committee would suggest that the Institute should follow up the matter with the firm to ascertain potentialities of the process.

C. Seasoning and Preservation of bamboo

37. Bamboo is a poor man's timber and its life could be prolonged by proper treatment and preservation. It has been represented to the Committee that though processes have been evolved at the Institute for seasoning and preservation of bamboo, these have not received adequate publicity.

The representative of the Ministry has stated in evidence that leaflets and pamphlets in English and Hindi have been issued on the methods of bamboo seasoning and preservation. Demonstration have also been given to the visitors in several exhibitions on how to treat bamboo. The representative of the Ministry has expressed the view that if the work could be taken up by the Development Blocks and other village organisations engaged in rural development, better results could be achieved. *The Committee endorse this view, and suggest that Government should take energetic steps to see that the results of research in this field reach the people who are in need of them. In this connection, it may be advantageous to utilise the publicity media of the Ministry of Information and Broadcasting and the field organisation of the Ministry of Community Development and Cooperation.*

D. Raising plantations of fast growing species of bamboo etc.

38. The Committee drew the attention of the representative of the Ministry to the following statement made by

the Industrial Adviser, Directorate of Technical Development, Government of India in the meeting of the Advisory Board of Research for Forest Research Institute held in March, 1964:—

“Today, practically all the bamboos that were available had been booked. For the next few years, the paper industry would have to depend upon bagasse. Even this exhaustive source of raw material was closely linked with the production of sugar as also providing alternative fuel for sugar industry. Even by utilising all the bagasse and other agricultural residues, we might be able to come upto the middle of the Fifth Plan. Thereafter, there was going to be an acute shortage of the raw material for the Paper Industry.....”.

In this context, the representative of the Ministry has informed the Committee that a number of new species of bamboos have been tried by the Forest Research Institute and information about them has been passed on to the States.

The Committee consider it of paramount importance that vigorous efforts may be made by the Forest Research Institute in the direction of finding out quick growing species of bamboos, Eucalyptus etc. so that large scale plantations of such species could be raised by the States as early as possible to meet the rising demand for raw materials for paper industry and other wood based industries. The Forest Research Institute should keep in close touch with the Forest Departments of the States and give them all the necessary guidance, technical as well as scientific, so that the latter can implement the programme in the field successfully.

E. Research on Timber

39. Some of the important results achieved by the Forest Research Institute in its research on timber are enumerated below:—

- (a) The data on seasoning, preservation and strength properties of more than 200 commercially important timbers have been collected. More than 100 seasoning installations and timber-treating

plants have come up in the country, entirely based on the results of work of this Institute and the help given by it. The work done in this Institute has helped in establishing plywood and other industries engaged in the manufacture of various forms of built-up timber.

(b) Work has been done to promote the economic use of short length small dimensioned timber in timber structures. A number of structures have been erected in the country in which use has been made of short length small dimensioned timber of secondary species.

40. The Committee understand that the following problems are at present engaging the attention of the Timber Engineering Branch of the Forest Research Institute:—

- (1) To promote the wise and economic use of timber of secondary species of short length and small dimensions.
- (2) Formulating the research data and demonstrative observations in the shape of Indian Standards Code of Practices.
- (3) Scope of Timber concrete Composite Construction for special structures in economising the structural cost of buildings.
- (4) Constructional methods of termite prevention.
- (5) Utilising secondary species of timber of short length small dimensioned sizes in designs of nail jointed timber posts for electric transmission post, transmission towers and telephone posts etc.
- (6) To standardise the designs by way of blue prints prepared for use in structural roof frames.
- (7) To give field guidance to Government Engineering Departments and private concerns.
- (8) To study the strength of constructional timbers under various types of jointing devices, such as

nails, bolts, wooden dowels and metal connectors.

- (9) To make investigations on timber columns in different species for various design factors.
- (10) To standardise the sizes of different constructional units engaged in timber construction for easy and economic fabrication.

41. The Committee understand that the annual production of industrial wood in India on a sustained basis is at present about 8 million cu. m. as against the estimated requirement of 11 million cu. m. in 1965. This gap between demand and supply is expected to increase during the Fourth and Fifth Plans, as will be seen from the figures furnished below despite the adoption of various measures such as improved logging techniques and working of some of the inaccessible forests clearfellings for plantations in the Third Plan, plantations of fast growing industrial species etc:

Year	Requirements	Anticipated production	Deficit
	(Mm ³)*	(Mm ³)*	(Mm ³)*
1965	11.00	8.00	3
1970	17.00	14.30	2.7
1975	25.00	19.00	6.0

The Committee understand that this deficit would be met to some extent by the use of small dimensioned timber in construction and increased use of secondary species of timber after seasoning and preservation treatment.

The Committee would suggest that besides making a concerted effort all over the country to increase the forest resources, particularly by planting fast growing species like Eucalyptus, Casuarina etc. there is need for ensuring better economic utilisation of available resources. They would emphasise that research on increased use of secondary species of timber after seasoning and preservation treatment should be intensified and the use of small dimensioned timber in timber structures encouraged by suitable publicity measures and by holding practical demonstra-

*Million Cubic Metres.

tions. The Committee expect that the User Departments of Government would give a lead in putting to use the results of research which would make for better economic utilisation of forest resources. In view of the volume of the estimated deficit in the next ten years, the Committee would suggest that the whole problem of ways and means to cover this deficit may be gone into in detail by an Expert Committee to be constituted for the purpose so that a perspective plan can be formulated for developing forest resources in the country commensurate with the present needs and future requirements.

F. Introduction and manufacture of modern logging tools

42. Economic and efficient harvesting of timber crops and their conversion into a wide variety of useful materials constitute a very important aspect of any scientific forest management. The technique of harvesting has been changing from time to time depending upon scientific development of equipment, labour conditions and the uses to which the wood can be put. Wood harvesting is one of the weakest links in the management of forests in India.

43. The Committee understand that efforts are being made to introduce some modern logging tools in use in some of the European countries mainly Sweden, in the logging operations in India to effect economy and efficiency. These tools mostly comprise saws, axes, wedges, felling and cutting tools. The Forest Research Institute has imported a small quantity of these modern tools and is trying to demonstrate to people how to use them and how effective and better they are than the traditional tools. The Institute is also training a number of people from the States in the use of modern tools. The Committee note that efforts are also being made by the Institute to get these modern tools copied in the country. It is stated that the drawings and specimens of these tools have been sent to a number of engineering firms which are trying to produce prototypes of similar tools. These tools are being tested in actual operations to identify the defects and effect improvements.

The Committee understand that recently some mechanised means for improving harvesting of forests have been adopted in Punjab and Himachal Pradesh.

The Committee consider that there is need for intensifying research on logging tools and other mechanised means for improving timber yield. In this connection, it may be useful to undertake a comprehensive study of the progress made by such States as Punjab and Himachal Pradesh in adopting modern logging tools and other mechanised means for harvesting of forests so that in the light of field experience research can be intensified to evolve such logging tools as are best suited to the Indian conditions. The Committee also need hardly stress the desirability of encouraging manufacture of logging tools and other modern equipment for harvesting of forests within the country.

G. Research on Railway Sleepers

44. The Committee have been informed by the Ministry of Food and Agriculture that based on the researches made in Timber Mechanics Branch of the Forest Research Institute it has been found that size of the railway sleeper can be suitably reduced so that without any particular loss in strength-factor, considerable economy can be achieved, as from the same logs, the output of the sleepers could be increased from 50—100 per cent by taking sleepers of reduced size 8" x 5" in place of usual size 10" x 5".

In a written note furnished to the Committee, the Ministry of Railways have stated that the Railways were asked to carry out trials with 8"x5" section in place of 10"×5" of B. G. wooden sleepers and 7"×4½" section in place of 8"×4½" M. G. wooden sleepers. However, after sometime, trials were continued only with B. G. wooden sleepers and the results of the trials were assessed by the Railway Board in 1958 when it was decided not to adopt the revised sizes for the following reasons:—

“(i) With the smaller size sleepers, their total number required per rail length has to be increased, in order that the train loads are distributed properly to the ballast and formation. However, each sleeper, when it is small, has to carry a higher intensity of load because the same loads pass over each sleeper in turn. The intensity of loads and the stresses in the case of sleepers of smaller cross-section are, therefore, higher. Keeping in view the fact of increase in traffic,

any reduction in sleeper size will be a retrograde step.

(ii) Due to larger number of sleepers per rail, more bearing plates and dog-spikes are necessary, resulting in greater expenditure, on these fittings. Three Railways had called for tenders/ offers for reduced size of sleepers. The rate per cft. obtained by two Railways was higher with the smaller size, while on the third Railway no quotations could be obtained for the smaller size sleepers. Therefore, anticipations of larger supplies of the smaller size were also not fulfilled."

When the President of the Forest Research Institute and Colleges was asked by the Committee during the course of evidence whether the reduction in size of railway timber sleepers suggested by the Institute had been accepted by the Ministry of Railways, he replied: "They are considering the suggestions."

In view of the difference of opinion between the Forest Research Institute and the Ministry of Railways on the use of sleepers of reduced size 8" × 5" in place of the usual size 10" × 5", and in view of the importance of the issue, the Committee suggest that the matter may be thoroughly gone into by a high-powered Committee consisting of representatives of the Forest Research Institute, Ministry of Railways and some outstanding scientists with specialised knowledge in the field so that a scientific solution regarding the most economic and reliable size for railway wooden sleepers is found.

45. The Committee have further been informed by the Ministry of Railways that the Forest Research Institute has been requested to carry out investigations in regard to the life of non-durable species of wooden sleepers after treatment. It has also been stated by the Ministry of Railways that large quantities of non-durable species are used on the Indian Railways at present, regarding which sufficient data are not available. The Committee understand that the Forest Research Institute are already attending to the problem.

The Committee would suggest that the Forest Research Institute should intensify the research on the problems of

non-durable species of wooden sleepers which are being used in large quantities on the Railways.

H. Making of Building Board out of Saw Dust

46. The Committee have been informed that the Forest Research Institute has developed a process for making building board, an imported item, out of saw dust but its commercial exploitation has not yet been taken up by the parties who were leased the patents due to non-availability of foreign exchange for importing the requisite machines for this purpose. The Committee desired to know the value of building boards imported by India during the last three years. The Ministry have informed the Committee that figures for building board as such are not available, but figures for boards including fibre boards, insulation boards, soft wall boards etc. are as follows:

1961-62	1962-63	1963-64
Rs.	Rs.	Rs.
555,512	605,867	340,968

The Ministry have further informed the Committee that to start with, five plants would be required and each plant is estimated to cost Rs. 15 lakhs.

It has been stated that the total import of all boards including fibre boards, insulation boards, soft wall boards, and also building boards, was just a few lakhs of rupees (about Rs. 4/5 lakhs); but it is not clear to the Committee whether any assessment has been made of the prospects of further increase in the demand of these boards and particularly of the building boards, and whether building boards can be used in substitution of the other boards mentioned above. The proposal for the import of machineries worth Rs. 75 lakhs (5 plants each costing Rs. 15 lakhs) seems to be somewhat beyond proportion of the present demand in the country.

The Committee however, feel that any research developed in the country should be given full opportunity for commercial exploitation. As such, the Committee would suggest that the economics of the process patented, in view of the present and prospective demands of building boards, may be properly assessed and then it may be examined if a pilot scheme with one plant can be set up. On the success

of that pilot plant, the proposal for commercial manufacture of building boards may be taken up later on.

I. Making of Chip Board and Fibre Board out of Wood Waste

47. The Committee understand that for the preparation of chip board and fibre board several species of off-cuts of timber based industry, twigs and branches from forests, and species of wood not being used for any thing in particular, have been tried on a laboratory scale with encouraging results.

It has been stated during evidence that the above forms of wood waste can be utilised for commercial purposes but the economics of utilising wood waste have not been worked out.

The Committee suggest that the economics of the process of utilising the above forms of wood waste on commercial scale may be worked out.

J. Development of Small Scale Forest Based Industries

48. One of the most difficult problems facing the country is providing gainful employment to the unemployed and under-employed persons living in the rural areas. The Committee understand that about 6,00,000 persons are engaged directly in primary occupations connected with the management and exploitation of forests while a larger number is employed in trades and industries dependent on timber and other forest products. *The Committee consider that forest-based industries can be effectively developed to provide employment to the people in the rural areas which are located close to the forests. The Committee would suggest that the question of utilising the services of the Forest Research Institute to find out suitable lines of forest-based small scale industries for providing gainful employment to people living in rural areas may be vigorously pursued.*

K. Timber Requirements of Ship-building Industry

49. The Committee understand that the estimated annual requirement of timber by the Indian ship-building industry is about 15,000 cubic metres and over 50 per cent of the requirement is met by importing timber which consists mostly of Burma teak and American douglas fir or Oregon pine.

The quantity and value of ship-building timbers imported by the Indian ship-building industry during the last three years are as follows:—

Year (April to March)	Quantity (in cubic metres)	Value (in rupees)
1961-62	11,504	98,24,902
1962-63	8,388	72,73,992
1963-64	3,848	38,86,899

50. The Committee note that *Lignum vitae* (*Guaiacum officinale*) a South American timber has been for a long time, the only timber used for propeller shaft bearings of ships. During the last war, when supplies of this timber became extremely difficult to obtain, 'red ebony' a timber of unknown origin was found to be a satisfactory substitute by the Mazagaon Docks and the Indian Navy. This timber was subsequently identified at the Forest Research Institute as Red Cutch or *Lal Khair* (*Acacia chundra*) which until then was mostly used as fuel. Subsequently the suitability of this timber from various parts of India has been tested. Strength tests and anatomical studies carried out at this Institute have shown that Red Cutch compares favourably with *Lignum vitae* and is in no way inferior to it in most properties that are of importance in bearings, provided the timber is carefully selected

As regards other timbers required by the ship-building industry, based on first hand information collected at different ship-building yards in the country, the Institute has suggested promising or likely substitutes for Burma teak and American douglas fir. Among Indian timbers which have been tried and found suitable are Poon and Pali for hold sparring and bilge ceiling, sal for keel blocks, wedges and shores, and Malabar teak for decking and awning.

Experiments are being carried out at Bombay, Cochin, Madras and Waltair for evaluating the natural durability of indigenous species of timber and the effect of wood preservatives for increasing their service life in sea-water.

51. It has been stated by the Ministry that the main difficulties in the way of using indigenous timbers for

ship-building are as follows:

- (i) non-availability of timber species suitable for all types of ship construction.
- (ii) the difficulty of obtaining the available species in long clear length and large sections usually required for ship-building.
- (iii) the difficulty of obtaining properly seasoned and carefully graded and selected timber at competitive prices.
- (iv) the reluctance on the part of insurers of ships which are mostly foreign companies to accept indigenous timbers in place of imported timbers of established repute like Burma teak and American douglas fir.

The Committee note that the value of timber imported for ship building has come down from Rs. 98.25 lakhs in 1961-62 to Rs. 38.87 lakhs in 1963-64. The Committee would stress the need for intensifying research to find suitable wood as substitute for imported timber and to develop resources for making available timber of desired species in large sections and appropriate lengths. The Committee would suggest that a scientific plan for meeting the timber requirements of the growing ship building industry from within the indigenous resources may be drawn up in collaboration with the ship building industry.

L. Survey of Timber Industries

52. The Committee note that a survey of the carving and ivory inlay industries of Hoshiarpur has been carried out and as a result of the survey the Director of Industries, Government of Punjab is putting up a timber seasoning kiln on the advice of the Forest Research Institute for proper seasoning of timber for supply to the wood carvers of Hoshiarpur.

They have been informed that a scheme for the spot study to be made by the Forest Research Institute to find out the trends in timber utilisation covering a vast field, namely, what timber industries exist, what timber they use, scope for future expansion, study of requirements of new industries, was sanctioned by Government for inclusion in the Third Plan, but was subsequently suspended due to Emergency. Under that scheme, thirty-two

industries were earmarked for survey at an estimated expenditure of Rs. 2 lakhs. The representative of the Ministry in his evidence before the Committee has expressed the view that "these surveys should not have been curtailed."

The Committee suggest that the practical utility of the survey of timber industries already made may be carefully assessed and in the light of findings, the question of extending the scheme of survey to other industries may be considered.

M. Finding Indigenous Substitute for Cork

53. The Committee note that corks of the value of about Rs. 30 to 40 lakhs are imported every year. They understand that the Forest Research Institute has been working on finding a substitute for cork out of various timbers by processing the fine particles, glueing them and making them into tissues. They have been informed that the Forest Research Institute has succeeded in finding suitable cork for certain specific purposes e.g. cork for aerated water bottles but not for general use.

The Committee have been informed by the Ministry that efforts have been made for sometime past to introduce cork trees in India. *Quercus suber*, which is one of the major cork-yielding species, was introduced in 1944 and a small plot was raised in Forest Research Institute and also in Chakrata forests of Uttar Pradesh. This species, being from Mediterranean habitat, namely: Spain, Italy, Algeria etc. did not thrive so well in Dehra Dun and Chakrata. Further consignments of seeds have been obtained from proper sources and some seedlings have been raised from these seeds for planting at Forest Research Institute. Some seeds have also been supplied to some of the State Forest Departments for planting in suitable coastal localities. The main difficulty is regarding the germination of seeds which appear to lose viability very soon. Propagation of these species by importing seedlings is also being undertaken.

The Committee suggest that efforts to find a suitable substitute for cork for general use and to grow cork trees should be intensified so that import of cork may be stopped at an early date.

N. Research on Resin Tapping

54. The Committee have been informed that research work on the subject of resin tapping has been undertaken by the Forest Research during the past nine years for augmentation of resin yield from Chir pine (*Pinus roxburghii*) and improvement of the quality of resin. The results of recent experiment are stated to be as follows:—

- (1) By nailing the lips that are used for collection of resin, the resin yield has been increased by about 20 per cent more than the yield obtained previously under the practice of inserting the lips in the wood.
- (2) By increasing the number of blazes from one to four per tree per season, i.e., from March to December, there is considerable increase in the yield without loss in vigour of the tree. The results are as follows:—

1 Blaze	2 Blazes		3 Blazes		4 Blazes	
	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical
<i>Average Resin yield per tree per year in gms.</i>						
2805	4531	4212	8067	4635	8068	8208

The yield increases significantly upto three blazes. There is no significant increase in yield by having blazes more than three on the same tree as this depends on the development and health of the trees under such heavy tapping.

- (3) By removal of encrustation by washing the face of the channel with suitable solvents, the flow of resin is greatly facilitated thereby augmenting the yield.
- (4) Experiments are being carried out to find out if the progeny of the highest yielders would maintain the same high yield.
- (5) More frequent freshening of the blazes at an interval of two days rather than 6 to 7 days, as is the practice in vogue, increases the yield by

about 90 per cent to 100 per cent even without use of chemical solvents.

(6) Experiments have been undertaken to investigate how the yield could be augmented by fertilizing the trees with Ammonium sulphate, superphosphate and sulphate of potash. The work is continuing.

55. The Committee learn that the following problems are engaging the attention of the Institute:

- (i) to determine the climatic factors and the characters like diameter, twist, crown size, crown density, etc. responsible for resin production in case of chir pine;
- (ii) to assess resin yield from various heights of the chir pine tree;
- (iii) to find out the optimum frequency and the intensity of tapping during the different months of the year;
- (iv) effect of chemicals on blazes to stimulate flow of resin;
- (v) study of viscosity of resin to ascertain the quality and quantity of resin produced.

The Committee would suggest that research on the above problems particularly regarding optimum frequency for tapping and the effect of chemicals on blazes to stimulate flow of resin should be intensified.

O. Improving Quality of Medicinal Plants

56. The Forest Research Institute is carrying out investigations on the growth, propagation, harvesting etc. of the medicinal plants which are minor forest products. Following is the list of medicinal plants and their extracts which have earned foreign exchange by way of exports during the year 1963-64:—

<i>Raw material</i>	<i>R.</i>
1. Chirata	79,711
2. Indian squill	26,725
3. Ipecac dried rhizome and roots	6,287
4. Kuth roots	3,304
5. Nux vomica dried ripe seeds	1,12,800
6. Psyllium husk or Isobgul husk	86,96,093

Raw material

7. Psyllium seed or Isobgul seeds	.	.	8,59,564
8. Sarsaparilla dried roots	.	.	539
9. Serpentina roots etc.	.	.	23,89,422
10. Senna leaves and pods	.	.	46,42,889
11. Tukmaria	.	.	26,245
12. Zedovary roots	.	.	28,922
TOTAL			1,68,72,501

Extracts, preparations etc.

1. Extract of glycyrrhiza	.	.	224
2. Extract of nux vomica	.	.	2,26,772
3. Strychnine alkaloids	.	.	4,23,003
4. Strychnine hydrochloride	.	.	2,26,987
5. Nuxvom alkaloids preparations etc.	.	.	34,350
6. Rauwolfia alkaloid	.	.	16,592
7. Eucalyptus oil	.	.	9,120
8. Other Botanical drugs derivatives etc.	.	.	1,33,977
TOTAL			10,71,025

GRAND TOTAL . . . **1,79,43,526**

As India has a long tradition of using indigenous medicinal plants in Ayurvedic and Unani systems of medicines with their very rich pharmacopoeia, the Committee feel that there is considerable scope for research to improve the availability and quality of the medicinal plants particularly those which have or can have a foreign market. They would suggest that there should be maximum contact and collaboration between the Forest Research Institute, Central Indian Medicinal Plants Organisation and Central Drugs Research Institute and other research organisations engaged in this field as also with the profession and pharmaceutical and chemical industry.

P. Spike Disease of Sandalwood

57. The Committee understand that the problem of tackling sandal spike disease which is responsible for damaging the valuable sandal trees in Mysore State has been engaging the attention of the Forest Research Laboratory, Bangalore for the last twenty years. Chemical methods have been developed for diagnosis of the disease and systematic research for the spike resistant strains

resistant strains of sandal has been undertaken, but so far no solution has been found to this important problem. The Committee further understand that a foreign expert had been called in 1960 tackle this problem and he had suggested certain measures to control this disease. The Committee would suggest that as sandalwood constitutes precious natural wealth of the country and earns valuable foreign exchange, intensified research should be made regarding the causes of sandal spike disease with a view to take remedial measures. They would suggest that the help of Food and Agriculture Organisation of the United Nations may be taken, if necessary, for intensifying research in this field.

Q. Research on Canes

58. The Committee have been informed that exact data on availability and local requirements of canes are not available as no thorough survey on the subject has so far been taken up. The indigenous demand is however greater than the supply. The deficiency in supply from local resources is made up by imports from Malayan Federation and Singapore. In the year 1963-64, canes worth Rs. 46,893 were imported.

The main species that are mostly imported are *Calamus caesius*, *S. scipionum*., *C. ornatus* etc.

India also exports small quantities of canes to Pakistan, U.K., U.S.A. In the year 1963-64 canes valued at Rs. 15,227 were exported.

59. The Committee have been informed by the Ministry that efforts to obtain suitable planting material of cane of Malayan quality for introduction into India have not so far been successful and that further efforts in this direction are being made. The Ministry have stated that it has been found that, with proper collection and processing, quality of indigenous canes can be improved considerably and in some cases they have been found to compare favourably with the Malayan ones.

It has also been stated that efforts are being made at the Institute to study cultivation, exploitation and utilisation of these commercially important canes. Seeds and planting material of some of the above Indian species along with technical know-how have been supplied by the Institute to the Forest Departments of Uttar Pradesh, Madras,

Madhya Pradesh, Himachal Pradesh, Bihar, Maharashtra and Andhra Pradesh for cultivation in their areas.

The Committee suggest that efforts to obtain suitable planting material of cane of Malayan quality for introduction in India should be pursued vigorously. They also suggest that studies relating to cultivation, exploitation and utilisation of the commercially important indigenous canes may be intensified.

R. Research on essential oil bearing plants

60. The Committee understand that large quantities of essential oils of peppermint, patchouli, citronella and clove are imported by India every year. Import figures of essential oils for the last three years are as under:—

(i) Essential oils perfume and flavour materials :

Year	Quantity in Kgs.	Value in rupees
1961-62	398360	1,00,88,000
1962-63	380423	79,58,526
1963-64	284666	68,01,630

(ii) Synthetic perfume and flavour materials :

Year	Quantity in Kgs.	Value in rupees
1961-62	12432	17,83,877
1962-63	44311	8,87,624
1963-64	40085	9,38,669

The Committee note that many of the essential oils like Palmarosa, lemon grass, sandalwood are being exported on a large scale and sizable foreign exchange is being earned.

The Committee suggest that efforts should be made to develop in the country essential oil perfume and flavour materials etc. which are at present imported from abroad.

The Committee have been informed that considerable research work has been done by the Forest Research Institute on certain essential oil bearing plants but it is difficult to assess the impact of research on the production of

essential oils in the country as administrative machinery to evaluate this kind of work is not available.

The Committee feel that the Institute should have followed up the matter with the State Governments to ascertain the practical value of the research done.

S. Commercial utilisation of research results

61. It has been stated in evidence that since 1949, twelve researches (Appendix IV) done by the Forest Research Institute have been patented and passed on to the National Research Development Corporation for commercial exploitation but only one of them about improvement relating to building boards from bamboo strips or the like materials has been commercially exploited so far. Apparently the National Research Development Corporation has not been able to interest the industry in exploiting the results of research. The Committee understand that at the eighth meeting of the Executive Committee of the Central Advisory Board on Forest Utilisation held on the 8th November, 1960 reference was made to the ineffective publicity arrangements for disseminating results of research carried out at the Forest Research Institute and a suggestion was adopted that a Development Wing might be set up in the Institute which would take up pilot plant work on the results of research. At the meeting of the Court held on 9th January, 1962, it was explained that although the Forest Research Institute had taken a number of patents and passed on the same to the National Research Development Corporation for exploitation, several of the patents had not been worked and nobody had taken up the process. It was, therefore, felt that an organisation should be provided under the Forest Research Institute which could take up these processes on a large scale and thereby try out and demonstrate their economics to the general public and the industry. Though the Court agreed in principle to the need for undertaking pilot plant work on processes evolved at the Forest Research Institute which had not been tried out for their economics, it suggested that such proposals for undertaking pilot plant work with the co-operation of the National Laboratories and the Industries should be further examined.

The Committee understand that a Forest Utilisation Officer was appointed in May, 1964 to build up closer con-

tacts and liaison with industries and to find out which processes evolved by the Forest Research Institute really required development and in which the industries were really interested. The Committee have been informed that it is only when adequate number of such projects become ready for trial that the question of having a separate development wing would arise.

The Committee are unhappy that with the exception of one, the patents taken out by the Forest Research Institute have not been commercially exploited so far. The Committee are not convinced that the remedy lies in developing a separate organisation within the Forest Research Institute for encouraging commercial exploitation of processes evolved by the Institute, for they consider that such a role should more appropriately be performed by the National Research Development Corporation. The Committee would, therefore, suggest closer liaison between National Research Development Corporation, the Forest Research Institute and other research institutes to achieve the desired objective. The Committee also recommend that the Second Expert Committee may thoroughly investigate the hurdles which have stood in the way of commercial exploitation of the products and processes evolved by the Forest Research Institute and suggest concrete measures to secure better commercial utilisation of the results of research.

MISCELLANEOUS

A. Liaison with Industry and Government Departments etc.

Liaison with Industry, State Forest Departments, scientific organisations and the public.

62. The main object of the research at the Forest Research Institute is to obtain results which will be of practical utility to the industry engaged in the manufacture of forest products and to the public in general. It is therefore of vital importance that there should be proper machinery for maintaining a close liaison with the wood based industry, scientific organisations, State Forest Departments and the public.

63. It has been stated during evidence that research problems are sent to the Institute partly by the industry and partly by the Forest Departments of the various State Governments. They are undertaken in collaboration with industry and the State Forest Departments by the research officers of the Institute and the results are communicated to the various Forest Departments as well as to the industries. A note furnished by the Ministry outlining the ways and means adopted for maintaining liaison with the various agencies is given at Appendix V.

64. The Committee would like to refer to the following extract from the statement made by the Chief Conservator of Forests, West Bengal in the meeting of the Advisory Board of Research held in March, 1964:

"Most of the research workers now are not so trained. They may have strong liaison with industry but have little contact with the forests. The research officers, during their tours rarely see the Forest Officers in the field, much less the forests. As such, the forestry bias is lost in the work. The Forest Research Institute and the State Forest Departments are getting more and more divorced

from each other. This is not a good sign as the problems need be studied in the field, solved in the research institutions and the solutions commercially utilised by the Industries."

The Committee consider it unfortunate that there should be occasion for a Chief Conservator of Forests of a leading State in forestry to voice his apprehensions about the growing gulf between the Forest Research Institute and the State Forest Departments. The Committee would like to recall in this context the origin and objectives of the Forest Research Institute and cannot too strongly stress the need for close and purposeful relation between the Forest Research Institute and the State Forest Departments. In fact, the responsibility for maintaining this purposeful relation rests as much with the Forest Research Institute as with the State Forest Departments. While the State Departments should feed the Institute with the problems and keep it informed of the application of research in the field, the Institute also should contact the Forest and Agricultural Departments of the States so that there is intimate link between research and its application.

65. The Committee understand that there is no close contact between the Forest Research Institute and the Botanical Survey of India. The contact at present is stated to be limited to occasional exchange of visits by the research workers in the two organisations. The Committee suggest that the possibility of having closer and formal collaboration between the Forest Research Institute and the Botanical Survey of India may be examined.

Need for
closer colla-
bor-
tion be-
tween Forest
In-
stitute and
Botanical
Survey of
India.

B. Research and Training Facilities

66. The Forest Research Institute offers facilities for the following courses of study and training:

- (i) Post-graduate, Post-M.Sc. and Post-Doctorate Research:
- (ii) Technical Training.
- (iii) Short timber course for personnel deputed by the Defence Department.
- (iv) Silvicultural research and statistical training.
- (v) Refresher course for forest officers.

- (vi) Extension course in Forest Botany and Forest Entomology.
- (vii) Advance Diploma Course in Pulp and Paper Technology.
- (viii) Advance Diploma and Certificate Courses in seasoning and preservation of timber.

The Committee understand that the paper industry is suffering from acute shortage of technical personnel. The Committee recommend that the requirements of the technical personnel for the paper industry and other forest based industries may be assessed and the question of utilising more intensively the training facilities at the Forest Research Institute examined, with a view to see how soon and how best the shortage can be overcome.

C. Staff Matters

(a) Staff Strength

67. The actual strength of officers and staff of the Forest Research Institute and Colleges, Dehra Dun, Forest Research Laboratory, Bangalore and Southern Forest Rangers College and Research Centre, Coimbatore as on 1st October, 1964 was as follows:—

	Gazetted	Class III	Class III	Class IV
	Technical	Ministerial		
Forest Research Institute and Colleges, Dehra Dun	105	408	201	618
Forest Research Laboratory, Bangalore	5	15	6	22
Southern Forest Rangers College and Research Centre, Coimbatore	15	19	19	70

68. The Committee have been informed by the Ministry that the activities of the Forest Research Institute include (a) permanent long term research work, (b) temporary activities for specified periods, and (c) specified work on completion of which the staff is not required. As in other Research Institutes, the Forest Research Institute has per-

manent as well as temporary posts; the latter for special temporary work as shown below:—

Type of temporary work	No. of posts
(i) For revising and bringing up to date the Forestry books published long ago	
Class I	3
Class III	4
Class IV	3
(ii) For Research schemes under the Third Five Year Plan schemes (for the duration of the Plan period)	
Class I	3
Class II	12
Class III	53
Class IV	59
(iii) For research schemes being financed from PL 480 schemes each of which is in force for five years only	
Class I	4
Class II	4
Class III	16
Class IV	4

A review of the staff strength undertaken by the Department of Agriculture in 1963 showed that the following staff was surplus to the requirements on the basis of the then work load:—

Class III (Technical)	101
Class IV staff	54

The Committee note that the terms of the Second Expert Committee which has been set up to go into the working of the Forest Research Institute and Colleges include "study of the staffing position of the Institute viz., whether the Institute is overstaffed or provided with staff of the right calibre."

The Committee are distressed to find that no effective action has been taken since 1963 to reduce the staff found surplus to the requirements of the Forest Research Institute and Colleges. They would stress that the Expert Committee should be requested to look into this problem urgently so that staff surplus to requirements are not indefinitely carried on the strength of the Institute.

(b) Specialisation in research

Shifting of a research worker from his field of specialisation

69. The Committee understand that an officer who was formerly in charge of the Paper Pilot Plant and had done useful work on that Plant for several years has been transferred to the Chemistry Section with the result that the specialised knowledge and experience of the officer in regard to the working of the Paper Plant could not be made use of. In this connection, the representative of the Ministry has stated during evidence before the Committee that "sometimes the administrative difficulties arise for promoting a person and when the best available person is not able to be fitted in his own Branch, we have to put him in the next best place". He has admitted that he is "not happy at all" at such a practice and has expressed the view that "the rules which apply to the general administrative side should not be applied to research work".

The Committee consider that in the interest of ensuring uninterrupted continuation of research schemes the practice of shifting a research worker from his field of specialisation to another field merely to satisfy the administrative requirements is undesirable and deserves re-examination by Government with a view to find out ways and means whereby reasonable opportunities of promotion to the scientists could be ensured without dislodging them from the special field for which they are best fitted.

(c) Recruitment Rules

Delay in finalising recruitment rules.

70. The Committee are constrained to observe that although action to frame recruitment rules for non-tenure scientific gazetted posts in the Forest Research Institute was initiated as early as 1950, the rules could not be finalised until the beginning of December, 1964. In this context, the Ministry of Food and Agriculture have informed the Committee as follows:

"Steps to frame recruitment rules for non-tenure scientific gazetted posts were taken up in 1950 but a little later further action was suspended on account of a proposal to constitute a Central Forestry Service. The Central Forestry Service did not materialise and in 1957 the proposal to finalise the recruitment rules was revived. Further action was, however, again

held up because an *Ad Hoc Committee* was meanwhile set up to suggest some basic changes in the method of recruitment etc. In March 1962 certain changes were approved on the basis of the recommendations of the *Ad-Hoc Committee*. Thereafter action on finalisation of the rules was resumed. The Director General of C.S.I.R. had also to be consulted, besides the President, F.R.I. and Colleges and the Branch Officers of the Institute in respect of the qualification required for each post. Thereafter the rules were sent to U.P.S.C. early this year. Their approval has come on 3rd December 1964.

Meanwhile the draft recruitment rules which had been prepared in 1950 originally have, with necessary changes, been followed."

The Committee consider that this is an inadequate explanation for the inordinate delay in the finalisation of the recruitment rules, and cannot help feeling that the Ministry has been dilatory in this matter. They trust that the recruitment rules would be promulgated without further delay.

CONCLUSION

71. The Committee note that the Forest Research Institute has made certain important contributions in forestry research such as making of paper from bamboo, the development of Ascu, an important wood preservative, the improvement of qualities of many secondary Indian timbers by seasoning, compression and impregnation to serve as suitable substitutes for imported woods, the designing of structures using short length and small dimensioned timber of principal as well as secondary species, the development of match industry based on semul (formerly considered a worthless timber) and other soft wooded species, the building up of plywood industry, investigations on sandalwood oils and the oleo resin from chir pine leading to the establishment of big industries for the manufacture of sandalwood oil, gum turpentine and gum rosin etc. But there are certain other directions in which much headway has yet to be made, e.g., logging and extraction of timber, especially from mountainous regions, suitability of unconventional raw materials for manufacturing pulp and paper, and research on technology for making pulp from different raw materials, tackling of spike disease of sandalwood, commercial exploitation of results of research, etc.

The Committee would stress the paramount importance of intensifying research in silviculture. This would obviously entail more active research effort, not only into the requirements of species already being employed to establish the new plantation forests, but also, should they fail, to ensure that, other new species duly tested are available to take their place. It is also important to make sure from the start that the silvicultural experiments are soundly devised and laid out. The Committee would suggest that research on improvement of teak, sal, pine etc. should be intensified. Efforts to find suitable species of timber to eliminate import of timber for ship-building, should also be speeded up.

The Committee need hardly emphasise that the liaison between the Forest Research Institute and industry and the State Forest and Agriculture Departments should be close, effective and continuous. The Committee are inclined to believe that nothing would be more harmful to the future forestry in India than the neglect of "integral and organic relationship" between research and field forestry.

ARUN CHANDRA GUHA,

NEW DELHI:

April 9, 1965

Chaitra 19, 1887 (Saka).

Chairman,
Estimates Committee.

APPENDIX II

(Vide para 26)

Copy of Government of India, Ministry of Food and Agriculture (Department of Agriculture) Resolution No. 12-4/59-F, dated 4th November, 1961, as subsequently amended.

Constitution of a Court for F.R.I. and Colleges, Dehra Dun

RESOLUTION

SUBJECT: Forest Research Institute and Colleges, Dehra Dun—Constitution of a Court for.

1. The Government of India have had under consideration the question of effecting improvements in the working of the Forest Research Institute and Colleges, Dehra Dun, specially with a view to eliminating delays in the formulation and execution of research programmes and to ensure co-ordination of work in the various branches of the Institute and active liaison with other scientific institutions and the industry. After carefully examining various means by which the desired improvements in the administrative machinery and procedures of the Institute could be effected, Government have come to the conclusion that the objectives could be best achieved by delegating wider administrative and financial powers to the President of the Institute to the extent necessary and entrusting the responsibility for guiding and supervising the working of the Institute to a representative high-powered body to be known as the "Court of the Forest Research Institute and Colleges" with the Minister for Food and Agriculture as its Chairman. So far as the administration and working of the Institute is concerned, the Court will be assisted by an official Executive Council consisting of five members who are members of the Court. While the Court will lay down the policy and programme of the Institute and give general directions and guidance for its working, the Executive Council will be directly responsible for the administration of the Institute so as to ensure its efficient working.

The President is, accordingly, pleased to decide that all matters relating to the organisation and working of the Forest Research

Institute and Colleges be entrusted to a Court and an Executive Council, constituted as under:—

Composition of the Court of the Forest Research Institute and Colleges

The Minister for Food and Agriculture	..	Chairman
The Minister for Agriculture	..	Pro-Chairman
The Secretary, Ministry of Food and Agriculture (Department of Agriculture)	..	Vice-Chairman
Three Members of the Parliament (two from Lok Sabha and one from Rajya Sabha)	..	Members
Director-General, Council of Scientific and Industrial Research	..	Member
Joint Secretary, Department of Agriculture, in-charge of Forestry	..	Member
The Financial Adviser, Department of Agriculture, or his nominee	..	Member
The Inspector-General of Forests	..	Member
The President, Forest Research Institute and Colleges	..	Member
Three Chief Conservators of Forests from the States to be nominated by the Chairman for three years	..	Members
One eminent scientist to be nominated by the Chairman for three years	..	Member
One eminent engineer to be nominated by the Chairman for three years	..	Member
The Deputy Secretary in-charge of Forestry in the Department of Agriculture will be the Secretary of the Court.		

Composition of the Executive Council

The Vice-Chairman of the Court	..	Chairman
The Director-General, Council of Scientific and Industrial Research	..	Member

Joint Secretary, Department of Agriculture, in-charge of Forestry	..	Member
The Financial Adviser, Department of Agriculture, or his nominee	..	Member
The Inspector-General of Forests	..	Member
The President, Forest Research Institute and Colleges.	..	Member
The Secretary of the Court shall be the Secretary of the Executive Council.		

Functions of the Court of the Forest Research Institute and Colleges and the Executive Council

3. The Court will be responsible for generally directing and guiding the working of the Institute.

4. The Executive Council will be responsible for the administration of the Institute and its subordinate formations, in accordance with the financial principles and administrative rules and regulations of the Government of India. In this respect the Executive Council shall exercise all administrative and financial powers at present exercised by the Ministry of Food and Agriculture (Department of Agriculture) provided that recruitment to Class I and Class II posts will continue to be made in consultation with the Union Public Service Commission as required under the rules and regulations in force from time to time. In the matter of promotions of officers and staff, the Executive Council will, on behalf of the Court, have full authority, provided that in all cases decisions are taken on the recommendations of the appropriate Departmental Promotions Committee.

4A. The Executive Council may, by resolution, delegate to its Chairman powers to dispose of such administrative and financial matters as it may deem fit, without consideration of such matters by the Council, subject to the condition that the action taken by the Chairman under the power so delegated by the Executive Council shall be reported for confirmation at the next meeting of the Council. It shall be open to the Chairman of the Council to redelegate such of the powers delegated to him by the Council as he may deem fit, to the Joint Secretary in-charge of Forests in the Department of Agriculture subject to the condition that the action taken by the Joint Secretary under the powers so redelegated to him shall also be reported for confirmation at the next meeting of the Council.

5. The Court shall meet ordinarily once in six months and the Executive Council shall meet as often as necessary. The meetings of the Court shall be presided over by the Chairman of the Court or in his absence by the Pro-Chairman, and in the absence of both by the Vice-Chairman, who shall exercise all the powers of the Chairman at the meeting. In the case of the Executive Council, a member elected at the meeting shall preside in the event of the Chairman of the Executive Council being unable to preside. Five members in the case of the Court and 3 members in the case of the Executive Council shall constitute the quorum for a meeting provided that in respect of matters involving financial issues, one of the members shall be the Financial Adviser or his nominee. The decision of the majority of the members shall be the decision of the Court/Executive Council, a dissentient member or members having the right to record a separate note of dissent.

6. When a recommendation is made to the Chairman or Pro-Chairman of the Court in pursuance of a decision of that body at a meeting not presided over by the Chairman or Pro-Chairman, the views of the dissentient members shall be brought to his notice, if the members so desires.

7. In the case of equality of votes, the Chairman shall have a casting vote.

8. Where the Chairman or the Pro-Chairman of the Court/Executive Council does not preside at a meeting and the Chairman or Pro-Chairman of a meeting is unable to agree to the decision of the meeting in any particular case, it shall be open to him to suspend action until he has submitted the matter to the Chairman or Pro-Chairman of the Court for decision.

9. When a question before the Court/Executive Council involves a financial issue and the Financial Adviser or his nominee dissents from the majority decision at the meeting, it shall be open to the Financial Adviser or his nominee to require that the matter be placed before the Minister for Finance. If the matter is covered by the financial powers of the Ministry of Food and Agriculture at present, or by powers which may be delegated to that Ministry in internal Finance, it will be open to the Chairman or Pro-Chairman or Vice-Chairman of the Court or the Chairman of the Executive Council to over-rule the Financial Adviser or his nominee, but in other matters the Financial Adviser or his nominee may ask the matter to be referred to the Minister for Finance for his concurrence.

10. The decisions arrived at by the Executive Council, will be promulgated as orders emanating from the President and will be issued over the signature of the Secretary or other officer who may be authorised to authenticate orders in the name of the President.

11. The Secretary of the Court shall implement the decisions of the Court/Executive Council by the issue of communications on behalf of that body and in the name of the President of India in all cases.

Provided that where any such orders require prior consultation with other Ministries of the Government of India, the matter shall be referred by the Secretary of the Executive Council to the Department of Agriculture for such consultation.

12. All correspondence with State Governments relating to the technical aspects of the working of the Institute and Colleges shall be addressed direct by the Secretary of the Court to those Governments, but where consultation with the State Governments, on general matters of policy, deputation of officers and matters other than purely technical matters are involved, the Secretary of Court shall address the Department of Agriculture who will make the necessary consultations with the State Governments.

13. The business of the Court/Executive Council will be conducted in accordance with the following procedure:—

- (i) It will be open to the Chairman or Pro-Chairman of the Court or the Chairman of the Executive Council, as the case may be, to summon meetings at any time should he consider necessary.
- (ii) It will be open to any Member to suggest that a particular case should be placed before the meeting either for sanction or for discussion. In all cases which are to be referred to the meetings, a self-contained Memorandum will be circulated by the Secretary to each member. Ordinarily no item will be included in the agenda unless such a Memorandum has been circulated at least 10 days before the meeting but in special cases the Chairman may relax this limit. It will be open to the Chairman to admit any subject for discussion at the meeting even if it is not on the agenda.
- (iii) The minutes of the meetings will be prepared by the Secretary who will submit them to the Chairman for approval.

The minutes will then be circulated to the members for concurrence and on return after circulation, action will be taken in pursuance of the decisions recorded in the minutes. The minutes will be formally confirmed at the next meeting of the Court/Executive Council.

- (iv) A copy of the minutes of each meeting together with copies of the memoranda circulated to the members will be furnished to the Department of Agriculture immediately for information.
- (v) Any business which it may be necessary for the Court/Executive Council to perform, may be performed by resolution in writing circulated among all members and any such resolution so circulated and approved by a majority of the members signing, will be as factual and binding as if such resolution had been passed at a meeting of the Court/Executive Council provided at least 5 members of the Court or 3 members of the Executive Council have recorded their views on the resolution.
- (vi) A list of cases disposed of by circulation to the members of the Court/Executive Council shall be placed before the next meeting of that body for the information of its members and for any action which it should take.

14. It will be open to the Court to make minor changes in the procedure of business laid down above as may be found necessary from time to time.

15. It will be open to the Government of India (Department of Agriculture) to issue such further directions to the Court as may be considered necessary from time to time. The Government of India also have the right to amend or repeal any or all the provisions of these orders.

16. The above arrangements will come into force with effect from 1st December, 1961.

Order: Ordered that a copy of the Resolution be communicated to all the State Governments.

Ordered also that the Resolution be published in the Gazette of India for general information.

K. R. DAMLE,
Secretary to the Govt. of India.

APPENDIX III

(Vide para 28)

Composition of the Advisory Board of Research for Forest Research Institute and Colleges

Chairman:

Vice-Chairman of the Court of the Forest Research Institute and Colleges.

Members:

Joint Secretary Incharge of Forestry in the Ministry of Food and Agriculture (Department of Agriculture).

Inspector General of Forests.

Director General, Council of Scientific & Industrial Research.

President, Forest Research Institute and Colleges.

One representative each of:

- (a) Ministry of Commerce and Industry.
- (b) Ministry of Defence.
- (c) Ministry of Economic and Defence Coordination.
- (d) Ministry of Railways.
- (e) Indian Council of Agricultural Research.
- (f) Associated Chambers of Commerce and Industry.
- (g) Federation of Indian Chamber of Commerce and Industry.

One representative to be nominated by the Central Government for each of the following industries:—

- (i) Plywood.
- (ii) Paper.
- (iii) Match.
- (iv) Forest based industries not otherwise represented.

Four Chief Conservators of Forests of States to be nominated by the Central Government.

Chief Engineer, Central Public Works Department or his nominee.

Two Directors of Industries of State Governments to be nominated by the Central Government by rotation.

Nominee or nominees of the Central Government to represent interests not otherwise provided for.

The Secretary of the Court of the Forest Research Institute and Colleges shall be Secretary of the Advisory Board.

APPENDIX IV

(Vide para 16)

List of Patents taken since 1949

Sl. No.	Patent No.	Date of the patent.	Title of the Patent	Inventor	Date of Renewal.	Year of Renewal	Remarks
1.	42228	14-11-49	Improvements in or relating to building boards from bamboos strips or the like materials.	Dr. Narayananamurti, Leased to Western India Plywood.	14-11	14-11	
2.	46216	15-11-51	Improvement in or relating to manufacture of quick drying paint oils.	President, F.R.I. and Colleges.	15-11	15-11	
3.	46338	8-11-51	Improvement in the extraction of the fatty oil from the Kernels of Kamala.	-do-	8-11	8-11	
4.	46339	8-12-51	Improvement in or relating to the separation of vegetable oil gel. from non-drying oils.	-do-	8-12	8-12	
5.	47411	4-6-52	Improvement in or relating to building boards and moulded articles from wood or the like.	Dr. D. Narayananamurti and Shri J. George.	4-6	4-6	
6.	47412	4-6-52	Improvement in or relating to adhesive composition from coconut or the like shells for making boards plywood or moulded articles.	President, F.R.I. and Colleges. (C.W. Branch)	4-6	4-6	

1. 47655 14-7-52 Improvement in or relating to preparation of copper chlorophyll from leaves of plants. President, F.R.I. 14.7

8. 49054 25-2-53 A process for the treatment of Bamboo to further its utilisation in the manufacture of pulp paper or the like. President, F.R.I. and Colleges & C.S.I.R. (C. & P. & W.S. Br.) 25.2

9. 52894 13-10-54 Improvement in or relating to an adhesive composition and using glaten or cashewnut shell liquid. President. F.R.I. and Colleges. (C.W. Branch) 13.10

10. 52895 13-10-54 Improvement in or relating to a process for improving the properties of light timber like *Cryptomeria japonica* to make them suitable for pencil slates and the like. (C.W. Branch) -do- 13.10

11. 57267 20-7-57 An improved process for the treatment of bamboo to further its utilization in the manufacture of pulp paper, board or the like. President, F.R.I. and Colleges & C.S.I.R. (C. & P. & W.A. Br.) 20.7

12. 73697 12-12-60 High Yield Pulp from Cellulosic Material. President, F.R.I. and Colleges. (C. & P. Branch) 12.12

APPENDIX V

(Vide para 63)

Liaison with industry, State forest and industries departments, scientific organisations and the public:

The main object of the research at the Forest Research Institute, Dehra Dun is to obtain results which will be of practical utility to the industry engaged in the manufacture of forest products and to the public in general. It is, therefore, imperative that there should be proper machinery for maintaining a close liaison with the wood based industry, scientific organisations, State forest departments and the public. The following ways and means are adopted at present to achieve this object:—

(1) *Ways and Means to bring the research workers of the Forest Research Institute and Colleges in closer touch with the practical problems of forest based industries—*

The research workers of the Institute come in contact with the practical problems of wood based industries by frequent visits, by their representation on a large number of committees particularly relating to the industries of paper, plywood, timber seasoning, timber preservation, match wood, katha and hard-board etc. A liaison meeting between the research workers, representatives of the industries and the State forest departments is held every year to give a chance for discussion of their problems. Apart from the above a number of technical enquiries are attended to by the Institute to give guidance to the industry for its proper development.

(2) *Liaison between the Forest Research Institute and Colleges and the State Forest Departments—*

The annual liaison meetings with the representatives of State forest departments are a regular feature since 1958, and discussions on the research techniques and their utilization problems of State forest departments relating to silviculture, wood seasoning, wood preservation, plywood, paper, extraction of timber,

logging techniques, utilization of short length and small dimensioned timbers, extraction of essential oils from forest products, cultivation of medicinal and aromatic plants etc. are held.

A number of conferences and symposia have been held in this Institute, the proceedings and recommendations of which are communicated to State forest departments for their guidance. The Institute keeps them in view while formulating its research programme.

Refresher courses for the State forest officers are held in respect of Silviculture, Statistics and Timber Engineering. The research results of the Institute are published in Indian Forest Bulletins, Indian Forest Leaflets, Indian Forest Records and various outside journals from time to time.

(3) *Liaison between the Forest Research Institute and the industry—*

In 1953-54 the Estimate Committee of the Lok Sabha strongly emphasised that the Institute should be able to solve the day-to-day problems of the industry. Keeping in view the recommendations of the committee following action has been taken:—

- (a) representation has been given to the industry in the annual liaison meeting,
- (b) the bigger wood based industries are already in intimate contact with the Institute through various technical committees of the Indian Standards Institution and the liaison was further strengthened, by establishing personal contacts and visits of the owners and technicians of these industries to the Institute,
- (c) the Institute also carries out tests on the products supplied by them if a request is made by the industry,
- (d) the Institute is also working on finding out secondary Indian timbers for various industries as substitutes for the better known species and the imported ones,
- (e) the officers of this Institute particularly those connected with the Publicity and Liaison Branch were

deputed to undertake tour of the States of U.P., Bihar, West Bengal, Assam, Orissa, Madhya Pradesh and Maharashtra in 1959; Andhra Pradesh, Madras, Kerala and Mysore in 1960; Punjab, Rajasthan and Gujarat in 1961; and Himachal Pradesh in 1962. Contacts with the forest officials and representatives of the industries have been helpful in acquainting them with the latest achievements in the various fields of research at the Institute and at the same time eliciting from them a number of queries regarding the problems facing them.

(f) regular and *ad-hoc* training courses are held for the benefit of the workers sponsored by the various industries.

A Forest Utilization Officer has been appointed to strengthen and improve the liaison between Forest based industries and the Forest Research Institute.

(4) *Liaison between Forest Research Institute and other scientific organisations:—*

The Institute keeps liaison with the other scientific organisations by associating them in the review of their quinquennial programme, exchange of publications, sending their representatives to attend the meetings organised by them and organising training courses for their workers in the various fields such as wood seasoning, wood anatomy, timber mechanics, composite wood, timber engineering, etc.

In order to maintain a two way flow of knowledge and to keep abreast of the contemporary research work going on in other countries of the world, the Institute has got exchange relations with about 50 countries, e.g. Germany, U.S.S.R., Sweden, Canada, Australia, Japan, U.S.A., etc. etc. The Institute has thus established exchange relations for their literature from as many as 347 Institutions and Departments in various parts of the world.

(5) *Liaison between Forest Research Institute and public in general:—*

Public in general is kept informed of the research results by—

(a) articles in various journals, newspapers and magazines,

- (b) sale of and distribution of complimentary copies of research papers,
- (c) organisation of and by conducting tours for the visitors at the Forest Research Institute whose number is about 20,000 per year,
- (d) taking part in regional and industrial exhibitions and by participating in International exhibitions held in India and also abroad,
- (e) publicity posters, popular booklets, brochures are distributed to the universities, industries, technical institutions and the interested members of public,
- (f) Forest Research Institute exhibits showing various processes and their advantages as also films are supplied on loan to various central and State government departments, educational institutions, etc.

APPENDIX VI

Statement showing the summary of Conclusions/Recommendations contained in the Report

Sl. No.	Reference to Para No. in the Report	Summary of conclusions recommendations
(1)	(2)	(3)
1	18	The Committee feel that the designation of the head of the Forest Research Institute and Colleges viz. President, is not quite appropriate and suggest that it may be changed to 'Director' to conform to the designation of the heads of most of the research institutes in the country. Consequential changes in other designations in the Institute may also be made.
2	20	Keeping in view the professional requirements of the Forest Services and for the reasons stated above, the Committee have no doubt that the question of according the Forest Research Institute and Colleges status of a university would be considered in the background of the general policy of the University Grants Commission and Government in the matter of giving such status to educational institutions.
3	21	The Committee think that if the research problems of forests of all regions, particularly of Assam and Madhya Pradesh, which have rich resources of teak and other valuable wood, are to receive close attention, it is essential to establish Regional Research centres which may serve as feeder and extension points for the Forest Research Institute. It may also be considered whether a Regional Centre can be set up in the Andamans where there are really "virgin forests". They hope that an early decision will be taken in the matter.
4	23	The Committee feel concerned at the anticipated shortfall of Rs. 3 crores in expenditure on forest development in the Third Plan even against the reduced provision of Rs. 52 crores and suggest that every effort should be made to implement important schemes for forest deve-

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lopment according to the time schedule. The scheme on Farm Forestry may be reviewed and remedial action taken to speed up forest development.

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The Committee are distressed to find that only a small amount of Rs. 3.68 lakhs exclusive of the cost of construction of buildings during 1963-64, has been utilised in the first three years of the Plan on schemes of development pertaining to Forest Research Institute and Colleges and that the anticipated expenditure for the entire Plan period is expected to be only Rs. 26 lakhs against the Plan allocation of Rs. 90 lakhs. This indicates that the Plan provision was not made on realistic basis and that schemes were not drawn up or implemented in time. The Committee are surprised that when the scarcity of forest resources is admitted on all hands and the need for research widely recognised, so little of the plan provision should have been put to effective use to intensify research.

The Committee would suggest that the causes for the delay in the implementation of the planned schemes should be carefully gone into and remedial measures taken to avoid such recurrence in future. They would also stress that Government should now take urgent measures to speed up implementation of planned schemes which are considered useful, to the maximum extent possible, during the remaining period of the plan. It should also be ensured that in the Fourth Five Year Plan, development of Forest Research Institute does not suffer on account of its poor performance in the current Plan period.

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The Committee hope that the revised set-up of the Forest Research Institute has made for better coordination and administrative efficiency. They would, however, like to stress two aspects which had also been mentioned by the Expert Committee on the Forest Research Institute and Colleges in 1956, namely, that effort should be made to integrate the activities of the various Branches of the Institute and that there should be close link between forest research and education. The Committee would also stress that while liaison with the industry should be main-

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tained, the Executive Council of the Forest Research Institute and Colleges which includes amongst others the Inspector General of Forests should at the same time take particular care to ensure the practical forest character of research work and the efficient conduct of the forestry courses.

7 32 The Committee are constrained to observe that the Second Achievement Audit Committee has been set up after lapse of eight years although the recommendation of the Estimates Committee (1953-54) was for the appointment of "a Board say after three or five years". If the Achievement Audit Committee had been set up three years earlier, Government would have had at their disposal its advice before effecting reorganisation of the Institute into four Directorates in 1963. The Committee hope that the Achievement Audit Committee would now go into the working of the revised set-up and suggest what further measures, if any, are necessary to bring about closer coordination between the various Directorates engaged in forest research, and more efficient administration.

8 33 The Committee cannot over-emphasise the vital need for conducting research on the technology for making pulp from different raw materials and suggest that this should be accorded a high priority.

9 33 The Committee feel that if the paper industry has to expand, it is imperative that researches on the suitability of unconventional raw materials are carried out with missionary zeal. Indian forests contain large quantities of hard woods and concentrated research on the use of hard wood species for manufacturing pulp and paper will greatly help to meet the requirements of the future expansion of the industry.

10 34 The Committee hope that the question of raising the Cellulose and Paper Branch to the status of an independent National Research Institute would be carefully considered by Government in consultation with the Paper Industry and others concerned before any final decision is taken.

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11 34 The Committee would stress that early action may be taken by Government to make the paper pulp plant an economically viable unit and to see that any surplus capacity after training and research is properly utilised in productive purpose particularly for production of paper required by the Forest Research Institute and other Government Institutions and Departments.

12 35 The Committee whole-heartedly agree that if the Cellulose and Paper Branch is to serve any useful purpose it should be sensitive to the needs of the industry and inspire confidence in its technical ability. The staff should be fully conversant with the operational features of Production Mill so that they can approach the problems of the industry in a realistic manner and can render useful assistance to them.

13 36 The Committee consider that the practical application of research processes evolved in the Institute is of crucial importance. The Committee would suggest that the Institute should follow up the matter with the firm which had shown interest in the process evolved by the Institute for the treatment of bamboo to further its utilisation in the manufacture of pulp, paper, board or the like to ascertain the potentialities of the process.

14 37 The Committee suggest that Government should take energetic steps to see that the results of research on seasoning and preservation of bamboo reach the people who are in need of them. In this connection, it may be advantageous to utilise the publicity media of the Ministry of Information and Broadcasting and the field organisation of the Ministry of Community Development and Cooperation.

15 38 The Committee consider it of paramount importance that vigorous efforts may be made by the Forest Research Institute in the direction of finding out quick growing species of bamboos, Eucalyptus, etc., so that large scale plantations of such species could be raised by the States as early as possible to meet the rising demand for raw materials for paper industry and other wood based industries. The Forest Research In-

stitute should keep in close touch with the Forest Departments of the States and give them all the necessary guidance, technical as well as scientific, so that the latter can implement the programme in the field successfully.

16 41 The Committee suggest that besides making a concerted effort all over the country to increase the forest resources, particularly by planting fast growing species like Eucalyptus, Casuarina etc. there is need for ensuring better economic utilisation of available resources. They would emphasise that research on increased use of secondary species of timber after seasoning and preservation treatment should be intensified and the use of small dimensioned timber in timber structures encouraged by suitable publicity measures and by holding practical demonstrations. The Committee expect that the User Departments of Government would give a lead in putting to use the results of research which would make for better economic utilisation of forest resources. In view of the volume of the estimated deficit in the next ten years, the Committee would suggest that the whole problem of ways and means to cover this deficit may be gone into in detail by an Expert Committee to be constituted for the purpose so that a perspective plan can be formulated for developing forest resources in the country commensurate with the present needs and future requirements.

17 43 The Committee consider that there is need for intensifying research on logging tools and other mechanised means or improving timber yield. In this connection, it may be useful to undertake a comprehensive study of the progress made by such States as Punjab and Himachal Pradesh in adopting modern logging tools and other mechanised means for harvesting of forests so that in the light of field experience, research can be intensified to evolve such logging tools as are best suited to the Indian conditions. The Committee also need hardly stress the desirability of encouraging manufacture of logging tools and other modern equipment for harvesting of forests within the country.

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18	44	In view of the difference of opinion between the Forest Research Institute and the Ministry of Railways on the use of sleepers of reduced size 8"×5", in place of the usual size 10"×5", and in view of the importance of the issue, the Committee suggest that the matter may be thoroughly gone into by a high-powered Committee consisting of representatives of the Forest Research Institute, Ministry of Railways and some outstanding scientists with specialised knowledge in the field so that a scientific solution regarding the most economic and reliable size for railway wooden sleepers is found.
19	45	The Committee suggest that the Forest Research Institute should intensify the research on the problems of non-durable species of wooden sleepers which are being used in large quantities on the Railways.
20	46	The proposal for the import of machineries worth Rs. 75 lakhs (5 plants each costing Rs. 15 lakhs) for making building boards out of saw dust by the process developed by the Forest Research Institute seems to be somewhat beyond proportion of the present demand for building boards in the country.
		The Committee however feel that any research developed in the country should be given full opportunity for commercial exploitation. As such, the Committee would suggest that in view of the present and prospective demands of building boards, the economics of the process patented may be properly assessed and then it may be examined if a pilot scheme with one plant can be set up. On the success of that pilot plant, the proposal for commercial manufacture of building boards may be taken up later on.
21	47	The Committee suggest that the economics of the process of utilising wood waste such as off-cuts of timber based industry, twigs and branches from forests and species of wood not being used for any thing in particular, on commercial scale may be worked out.
22	48	The Committee consider that forest-based industries can be effectively developed to provide employment to the people in the rural areas

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which are located close to the forests. The Committee would suggest that the question of utilising the services of the Forest Research Institute to find out suitable lines of forest-based small scale industries for providing gainful employment to people living in rural areas may be vigorously pursued.

23 51 The Committee would stress the need for intensifying research to find suitable wood as substitute for imported timber used by the ship building industry and to develop resources for making available timber of desired species in large sections and appropriate lengths. The committee would suggest that a scientific plan for meeting the timber requirements of the growing ship building industry from within the indigenous resources may be drawn up in collaboration with the ship building industry.

24 52 The Committee suggest that the practical utility of the survey of timber industries already made may be carefully assessed and in the light of findings, the question of extending the scheme of survey to other industries may be considered.

25 53 The Committee suggest that efforts to find a suitable substitute for cork for general use and to grow cork trees in India should be intensified, so that import of cork may be stopped at an early date.

26 55 The Committee suggest that research on the resin problems referred to in para 55 particularly regarding optimum frequency for tapping and the effect of chemicals on blazes to stimulate flow of resin should be intensified.

27 56 As India has a long tradition of using indigenous medicinal plants in Ayurvedic and Unani systems of medicines with their very rich pharmacopoeia, the Committee feel that there is considerable scope for research to improve the availability and quality of the medicinal plants particularly those which have or can have a foreign market. They would suggest that there should be maximum contact and collaboration between the Forest Research Institute, Central Indian Medicinal Plants Organisation and Central Drugs Research Institute and

other research organisations engaged in this field as also with the profession and pharmaceutical and chemical industry.

28 57 The Committee suggest that as sandalwood constitutes precious natural wealth of the country and earns valuable foreign exchange, intensified research should be made regarding the causes of sandal spike disease with a view to take remedial measures. They also suggest that the help of Food and Agriculture Organisation of the United Nations may be taken, if necessary, for intensifying research in this field.

29 59 The Committee suggest that efforts to obtain suitable planting material of cane of Malayan quality for introduction in India should be pursued vigorously. They also suggest that studies relating to cultivation, exploitation and utilisation of the commercially important indigenous canes may be intensified.

30 60 The Committee suggest that efforts should be made to develop in the country essential oil perfume and flavour materials etc. which are at present imported from abroad.

31 60 The Committee have been informed that considerable research work has been done by the Forest Research Institute on certain essential oil bearing plants but it is difficult to assess the impact of research on the production of essential oils in the country as administrative machinery to evaluate this kind of work is not available.

The Committee feel that the Forest Research Institute should have followed up the matter with the State Governments to ascertain the practical value of the research done on oil bearing plants.

32 61 The Committee are unhappy that with the exception of one, the patents taken out by the Forest Research Institute since 1949 have not been commercially exploited so far. The Committee are not convinced that the remedy lies in developing a separate organisation within the Forest Research Institute for encouraging commercial exploitation of processes evolved by the Institute, for they consider that such a role

should more appropriately be performed by the National Research Development Corporation. The Committee would, therefore, suggest closer liaison between National Research Development Corporation, the Forest Research Institute and other research institutes to achieve the desired objective. The Committee also recommend that the Second Expert Committee may thoroughly investigate the hurdles which have stood in the way of commercial exploitation of the products and processes evolved by the Forest Research Institute and suggest concrete measures to secure better commercial utilisation of the results of research.

33 64 The Committee consider it unfortunate that there should be occasion for a Chief Conservator of Forests of a leading State in forestry to voice his apprehensions about the growing gulf between the Forest Research Institute and the State Forest Departments. The Committee would like to recall in this context the origin and objectives of the Forest Research Institute and cannot too strongly stress the need for close and purposeful relation between the Forest Research Institute and the State Forest Departments. In fact, the responsibility for maintaining this purposeful relation rests as much with the Forest Research Institute as with the State Forest Departments. While the States Departments should feed the Institute with the problems and keep it informed of the application of research in the field, the Institute also should contact the Forest and Agricultural Departments of the States so that there is intimate link between research and its application.

34 65 The Committee suggest that the possibility of having closer and formal collaboration between the Forest Research Institute and the Botanical Survey of India may be examined.

35 66 The Committee recommend that the requirements of the technical personnel for the paper industry and other forest based industries may be assessed and the question of utilising more intensively the training facilities at the Forest Research Institute examined, with a view to see how soon and how best the shortage can be overcome.

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36	68	The Committee are distressed to find that no effective action has been taken since 1963 to reduce the staff found surplus to the requirements of the Forest Research Institute and Colleges. They would stress that the Expert Committee should be requested to look into this problem urgently so that staff surplus to requirements are not indefinitely carried on the strength of the Institute.
37	69	The Committee consider that in the interest of ensuring uninterrupted continuation of research schemes the practice of shifting a research worker from his field of specialisation to another field merely to satisfy the administrative requirements is undesirable and deserves re-examination by Government with a view to find out ways and means whereby reasonable opportunities of promotion to the scientists could be ensured without dislodging them from the special field for which they are best fitted.
38	70	The Committee are constrained to observe that although action to frame recruitment rules for non-tenure scientific gazetted posts in the Forest Research Institute was initiated as early as 1950, the rules could not be finalised until the beginning of December, 1964. The Committee consider the explanation offered for the inordinate delay in the finalisation of the recruitment rules as inadequate, and cannot help feeling that the Ministry has been dilatory in this matter. They trust that the recruitment rules would be promulgated without further delay.
39	71	The Committee would suggest that research on improvement of teak, sal, pine etc. should be intensified.

APPENDIX VII

Analysis of recommendations in the Report

I. Classification of recommendations:

A. Recommendations for improving organisations and working:

1 to 10, 12 to 17, 19 to 35 and 37 to 39.

B. Recommendations for effecting economy:

11, 18 and 36.

II. Analysis of more important recommendations directed towards economy:

Sl. No.	S. No. as per sum- mary of recom- menda- tions (ap- pendix VI)	Particulars
1	2	3
1	11	Early action may be taken by Government to make the paper pulp plant an economically viable unit and to see that any surplus capacity after training and research is properly utilised in productive purpose particularly for production of paper required by the Forest Research Institute and other Government Institutions and Departments.
2	18	The question of using railway wooden sleepers of reduced size 8" x 5" in place of the usual size 10" x 5" may be thoroughly gone into by a high-powered Committee consisting of representatives of the Forest Research Institute, Ministry of Railways and some outstanding scientists with specialised knowledge in the field so that a scientific solution regarding the most economic and reliable size for railway wooden sleepers is found.
3	36	The Expert Committee should be requested to look into the staffing position of the Forest Research Institute urgently so that staff surplus to requirements is not indefinitely carried on the strength of the Institute.