

REPORT

OF THE

SECOND EXPERT COMMITTEE

ON THE

FOREST RESEARCH INSTITUTE & COLLEGES

DEHRA DUN

1965

REPORT OF THE EXPERT COMMITTEE

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CHAPTER I
INTRODUCTION

Appointment of the Committee

1.1 The Estimates Committee of Parliament in the sixth report (1953-54) recommended inter alia that in order to assess the actual achievements of the Institute from time to time, steps should be taken to appoint a Board of eminent scientists and representatives of the industry to conduct, periodically, an "achievement audit". There was already a Central Advisory Board on Forest Utilisation which performed functions similar to those referred to by the Estimates Committee. When the matter was discussed by the Board, they supported the Estimates Committee's recommendation for periodically assessing the research work done at the Forest Research Institute and Colleges, but suggested that an ad hoc Committee should be set up for this purpose. The Government of India accepted this suggestion and appointed, in 1956, the Expert Committee of the Forest Research Institute and Colleges, under the chairmanship of Prof. H.G. Champion. The main recommendations made by this Committee and the action taken on them are indicated briefly in Appendix I. It will be observed that several recommendations were either not accepted or not implemented.

In 1964, the Government of India in their Resolution No.13-3/63-F dated the 3rd October, 1964, appointed a Second Expert Committee consisting of the following:-

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|---|-----------|
| (1) Prof. M.S. Thacker,
Member, Planning Commission. ... | Chairman. |
| (2) Shri Hari Singh,
Inspector General of Forests. ... | Member |
| (3) Prof. M.V. Laurie,
Professor of Forestry,
Department of Forestry,
Commonwealth Forestry Institute,
Oxford University. ... | Member |
| (4) Dr. G.P. Kane,
Deputy Director General,
Dte. General of Technical Develop-
ment, Ministry of Industry. ... | Member |

- (5) Prof. P. Maheshwari,
Head of the Department of Botany,
University of Delhi. ... Member.
- (6) Shri S.N. Tulsiani,
Under Secretary to Government
of India, Ministry of Food
& Agriculture, Department of
Agriculture. ... Secretary

Terms of Reference

1.2 The terms of reference of the Committee were:

- (a) to review the progress of research done at the F.R.I. during the past 8 years (since the appointment of the Champion Committee) 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 F.R.I. including the regional research centres at Bangalore and Coimbatore and to suggest improvements;
- (c) to study the staff position of the Institute viz. overstaffed 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 on 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.

On a reference arising from the discussions relating to the status of the Forest Research Institute and Colleges, this question was also taken up by the Committee for advice.

Programme of work

1.3 Prof. Laurie arrived in India on the 9th March, 1965. The Committee held its first meeting on the 11th March to discuss the plan of work, taking into consideration the fact that Prof. Laurie had to leave India on the 20th of April, 1965. The Committee held meetings in Delhi and visited the Forest Research Institute and Colleges, Dehra Dun and the regional centres at Bangalore and Coimbatore. The programme followed by the Committee is at Appendix II.

1.4 The Committee invited comments from the President, Forest Research Institute and Colleges, Dehra Dun, the Ministry of Railways (Railway Board), the Ministry of Industry, the Department of Technical Development and the Chief Conservators of Forests of all States. Questionnaires were also sent to various important forest-based industries like Paper, Plywood and Match industries, and they were requested to furnish their comments. A list of the industrial and other organisations addressed and the questionnaires issued to them are shown in Appendix III.

1.5 During its visit to the Forest Research Institute and Colleges at Dehra Dun, the Committee had discussions with the officers and staff there. The President, Forest Research Institute & Colleges, was associated throughout with these discussions. An independent discussion with the President of the Institute was also arranged. At an informal meeting held on 15th April, 1965, the Committee took an opportunity of inviting the views of the senior retired officers associated with this Institute who happened to be in Dehra Dun at that time. These included, Shri M.D. Chaturvedi, former Inspector General of Forests and Sarvashri Aggarwal and Rehman, former Presidents of the Institute. The Committee took note of the observations made by the late Prime Minister on the Report of the Champion Committee.

The views expressed by Shri K.P. Sagreiya presently Senior Specialist (Forests) of the Planning Commission, who was President of the Forest Research Institute & Colleges, Dehra Dun, from 1960 to 1963, contained in his letter of 14th April, 1965, were also taken note of by the Committee.

1.6 At Bangalore and Coimbatore, the Committee held discussions with the former Director and the present Officer-in-Charge of the Forest Research Laboratory, Bangalore, the Principal, Southern Forest Rangers College, Coimbatore and the Chief Conservators of Forests of Mysore and Madras.

1.7 The Committee had also the benefit of discussions with the Central Advisory Board of Forest Research, the Court of the Forest Research Institute, its Executive Council and all the Heads of the Forest Departments of States and Union Territories. The Constitution and functions of the Central Advisory Board appear at Appendix IV and those of the Court of the F.R.I. and its Executive Council are at Appendix V.

1.8 The committee took into account the recommendations of the last Expert Committee and also the extent to which they had been acted upon before drawing up its general conclusions and recommendations. Its general conclusion was that very little has been done so far on some of the important recommendations of the First Expert Committee and whatever organisational steps were taken were neither in conformity with the recommendations of the First Committee nor did they help in improving the work of the Institute.

CHAPTER-II
HISTORICAL BACKGROUND AND ORGANISATIONAL FUNCTIONS.

(A) History of the Institute

2.1 The Forest Research Institute and Colleges, comprise a composite institute consisting of several units - the Forest Research Institute (FRI) the Indian Forest College (IFC) and the Northern Forest Rangers' College (NFRS) all located at Dehra-Dun, the Southern Forest Rangers' College (SFRS) and the Regional Forest Centre both located at Coimbatore and the Forest Research Laboratory (FRL) located at Bangalore.

2.2 In India, in the field of forestry, training came a little ahead of research. In 1878, a "Central Forestry School" was founded at Dehra Dun, for training of Rangers. In 1894, the Government of India took over the management of this School from the Government of the North-West Province (U.P.) re-named it as the Imperial Forest School, and placed it under the supervision of the Inspector General of Forests. The Forest Research Institute was established as the Research Wing of the School when its status was raised in 1906 to that of a college. In 1912, a separate two-year course was started at the Institute for training of officers of the Provincial Forest Services, and it continued till 1928. The Indian Forest College was started in 1926 for training of probationers of the Indian Forest Service in India, but had to be closed in 1932 when recruitment to the Indian Forest Service was stopped. During the period 1932 to 1933 training of the gazetted forest officers in the country remained suspended for want of students. In 1938, the Indian Forest College, was started in its present form for training of the officers of the Superior Forest Service, who then received a Diploma of Associateship of the Indian Forest College (AIFC). This College has since expanded.

2.3 In the South, the Madras Government started in 1912 a Rangers' College of its own at Coimbatore. This College has continued to train Rangers for some of the Southern States. In 1948, in pursuance of a policy to centralise forestry education and to organize and coordinate forestry research in the country, the

Government of India took over the College and placed it under the same administrative control as that of the Forest Research Institute and the two Forest Colleges located at Dehra Dun.

The Forest Research Laboratory, Bangalore, established by the Government of Mysore, was taken over by the Government of India in 1958. A Southern Research Centre in Forestry was established at Coimbatore in 1960.

(B) Present Organisational set-up

2.4 The Forest Research Institute & Colleges are under the administrative control of the Ministry of Food and Agriculture (Department of Agriculture) of the Government of India. Its administrative head is designated as the President.

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

2.6 Education in forestry is conducted in the following Colleges:

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

The Indian Forest College runs a two-year course for training the probationers of Gazetted Forest Service of all the States of the Indian Union. The minimum educational qualification required for admission is a degree in natural sciences or such other subjects as mathematics, economics and mechanical engineering. The average annual intake of students is 90, and there are 161 students at present. The head of the College, is designated as Dean. The Northern Forest Rangers' College and the Southern Forest Rangers' College impart training to Rangers of the Status of Northern and Southern regions respectively. The minimum educational qualification for the course is Intermediate standard, or equivalent. There

are at present 509 students undergoing training in both Colleges, the average annual intake being around 250. The heads of the Rangers' Colleges are designated as Principals. The educational activities of the three Institutions are coordinated by the Director of Forest Education under the over-all control of the President, F.R.I. & Colleges.

2.7 The research wing consists of a number of branches. These were grouped in 1958, following the recommendations of the Champion Committee, into the following eight Divisions:

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

2.8 In 1962-63, they were re-grouped into the following four Directorates:

- 1) Forestry Research
- 2) Biological Research
- 3) Forest Products Research
- 4) Forest Education.

2.9 The composition of the Research Directorates is as follows:

(a) Directorate of Forestry Research

1. Silviculture Branch
2. Logging Branch.

(b) Directorate of Biological Research

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

(c) Directorate of Forest Products Research

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

2.10 The publicity and Liaison Branch, the Statistics Branch and the Services Branch work directly under the President. The President is assisted in administrative matters by a registrar and also by an accounts Officer and a Stores Officer.

2.11 The Coimbatore unit of the Forest Research Centre is under the Principal, S.F.R.C., who is also designated as the Head of Biological Research. The unit at Bangalore is under the Head of Utilisation Research. Each of these units has a number of sections.

2.12. A chart showing the organisational set-up is given at Appendix VI.

2.13 Court and Executive Council of the F.R.I. & Colleges.

The Court and the Executive Council of the F.R.I. and Colleges were set up vide Ministry of Food and Agriculture Resolution No.12-4/59-F. dated 4th November, 1961. The Court is responsible for laying down the policies and programme of the Institute and for giving general directions and guidance for its working. The Executive Council is directly responsible for the administration of the Institute. The Court generally meets once in six months and the Executive Council as often as necessary, generally once in three months. The composition and functions of the two bodies are given in the Government of India Resolution, reproduced at Appendix V.

2.14 Advisory Board of Research.

The Advisory Board of Research constituted under the Ministry of Food and Agriculture Resolution No.14-1/62-F dated the 9th July, 1963, advises the Institute on the general policy on forestry research, assignment of priority to various items of research conducted at the Institute, and co-ordinating research with the needs of industry, agriculture and general public. The composition and functions of the Advisory Board of Research are given in Appendix IV.

(C) Functions

2.15 The main functions of the Forest Research Institute and Colleges are as follows:

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

CHAPTER III

THE CHANGING ROLE OF RESEARCH IN FORESTRY AND FOREST PRODUCTS.

3.1 During its 80 years' existence, the Forest Research Institute has attained world-wide recognition as the premier institution for research and education in forestry in the tropics. It has become the major clearing house for information on tropical forests. It is unique in being the only institution in the world that combines forest education with research in both forestry and forest products.

3.2 Like other organisations in the country, this Institute has also to respond to changed circumstances resulting from the demands of India's rapidly expanding economy. Formerly, production from the forests satisfied most internal demands and the main problems facing the Institute were those of general overall improvement of forest management and silvicultural efficiency and of finding uses and markets for unwanted forest produce. However, the situation has now changed. While technical and industrial development is proceeding fast, the production of raw materials for industries based on forest produce is not keeping pace with the demand for them and serious shortages are already being felt. The general rise in the standard of living has resulted in increases in the per capita consumption of both timber and fuel and this, combined with the steady growth in population difficult to meet. Studies in international timber utilisation trends have shown that, as a part of the Far East region, India is in the midst of an area that will be a deficit region by 1975 in regard to timber so that, even if foreign exchange were available for importing timber, India will not be able to procure supplies from the neighbouring country comprising this region.

3.3. There is, therefore, an urgent and imperative need for the country to increase its production of wood as quickly as possible. Not only are larger areas of productive forests required, but a very great increase in the production per hectare under forests is needed. The average level of production from the forests is very low and rates of production considered satisfactory in the past will not serve the purpose now. Low yielding natural forests will have to be replaced by intensive plantations of fast growing species, and every possible way of increasing production from forests must be tried. In this, India will be following the general trend in forestry management all over the world. In Australia, Africa, the Caribbean area and in Europe the trend is towards creation of artificial forests

of fast growing highly productive species. India has made a small start in this direction. But the scope for increasing plantations is immense and the imminent threat of shortages of wood makes large scale plantations an urgent need.

3.4 Forest production, unfortunately, cannot be raised overnight. Ways must be found to tide over the twenty to forty years' gap before the full yields from the planting programmes undertaken now are realised. Better use must, therefore, be made of the forest produce now available. Waste in utilisation must be cut down to a minimum, methods must be found for using species/or are considered unacceptable, and the possibilities of using a far wider range of wood as raw materials for industry must be investigated.

3.5 It is, therefore, to this new and challenging situation that forest research must adapt itself. The Committee, in the course of its investigations, gained the impression that in many branches, there was inadequate appreciation of the seriousness of the situation and the research programmes at the F.R.I. did not show any sense of urgency. Many items on current programmes, though possibly of theoretical and academic interest are not likely to give practical results which may be either commensurate with the expenditure involved, or which may lead to increased production from forests. Research at the Institute seems to be out of touch with the problems of the State Forest Departments and with industries based on forest produce.

3.6 It is essential in an Institute of this nature that research has clear, practical objectives. The main objectives of research at the Institute at the present time must be to discover ways to improve production from all types of forest land as fast as possible, and to utilise the produce from both natural forests and plantations more efficiently so as to make the best use of the inadequate forest resources of the country. Clear priorities must be established for those items that will have the greatest and most immediate impact on productive forestry in the States. The Committee would like to emphasise the need for the staff of the Institute to keep in much closer touch with the Forest Departments of the States so as to be alive to and qualities of wood that are at present unused

To their urgent problems and be able to give them all the necessary technical and scientific guidance for the successful implementation of their urgent programmes in the field.

3.7 Broadly speaking, the role of the Institute is to conduct research into all aspects of Silviculture, Forest Genetics, Ecology, Pathology and Entomology in order to determine the best and most rapid methods of increasing the productivity of the forests of India, whether by natural or artificial means, and of protecting and safeguarding them from diseases and insect pests. At the same time, rapid industrial growth in the country together with the severe restriction on imports and shortage of foreign exchange have suddenly increased the importance and urgency of research in wood technology, timber engineering, cellulose pulp and paper manufacture, the chemistry and the collection and cultivation of minor forest products and in general, the entire utilisation of forest produce. Equally important is the development of more efficient and less wasteful methods of extraction and converting of forest produce. The rapid advances in forest science and technology in other parts of the world since world War II have to be studied and adapted to India's requirements. This can only be done by this Institute which is equipped to sift and evaluate the mass of information continually coming in from sources all over the world.

3.8 In keeping with the increasing demand for trained personnel for forests the Forest Colleges have increased the intake to more than three-fold, (from 30 officer trainees and 75 ranger trainees to 96 and 208) respectively since 1948). The large scale nationalisation of forest which began in 1952 after land reforms in various States called for large numbers of trained personnel not only to manage the increased areas of forests but also to introduce much more intensive working plans under the Five Year Plans. It is likely that there will be a still further increase in the demand for forest education in the coming years.

CHAPTER IV

REVIEW OF WORK OF RESEARCH BRANCHES

4.1 Being the only institution in the country dealing with research as well as education in the field of Forestry, the Forest Research Institute has attempted to make its coverage of activities as complete as possible. The Committee reviewed the work of the various research branches of the Institute. In case of each Branch, its history, the work done in it and the manner in which it should function have been considered.

4.2 There is no doubt that the Forest Research Institute is doing good work. The Committee was given the report of the work of the F.R.I. for the year 1960-61 which was favourably commented upon in the Commonwealth Forestry Review.

4.3 But the Committee has also noticed in its discussions with the officers of State Forest Departments and representatives of forestry industry a strong feeling that the work of the Forest Research Institute has not adapted itself to modern conditions, that it is neither meeting sufficiently the needs of the State Forest Departments nor is it maintaining adequate contacts with the industry. The criticism was that the F.R.I. is unaware of the most pressing problems in forestry and of forest industries. The Committee kept this criticism in view in the course of its work.

(A) Silviculture

4.4 This Branch deals with the problems of growing trees and producing wood and is by far the most important Branch of the Institute. Most States have Silviculturists who deal with local problems while the F.R.I. deals with problems of all-India interest. The Branch also coordinates the work of the State Silviculturists, and provides help and advice on mensuration work and on conducting experiments. It initiates and co-ordinates cooperative research projects of common interest to several States. The Branch is the repository of all silvicultural information for India as a whole and runs an information and documentation service. It maintains and measures increment plots throughout the country and collects and analyses statistics on forest management. It is the Branch which is most directly connected with problems relating to forest management and those concerning improvement of and increase in forest produce.

4.5 The Branch has at present the following sections:

- i) General Silviculture including resin tapping
- ii) Experimental Silviculture
- iii) Mensuration
- iv) Forest Influences
- v) Ecology
- vi) Soils
- vii) General Documentation.

The Organisation and functions of these Sections are indicated below:

General Silviculture

4.6 The programme of this Section includes (as a curious anomaly of historical origin) resin tapping research as its major item. This is, strictly speaking not silviculture, but is done by the Silviculture Branch as a matter of convenience. Their field parties are a suitable agency for carrying out the work in forests, and the chir pine provenance plots in the Demonstration area which is under the Silviculturist are suitable material for experimentation. The work was started in 1955.

There are 21 experimental items on resin tapping. A number of useful results have been obtained, the most interesting being the discovery that a lip nailed to the tree results in much higher yields (20% more) than lip inserted into the tree, the standard practice. Various acid treatments of the blazes have been tested, and it has been found that 20% HCL solution gave the greatest increase in yield. Useful information on periods of freshening, height of blaze, American type versus Indian type tapping cycles, dates of commencement and ending of tapping season, etc. /_ have been obtained and all of these have application in improving tapping practice. High yielding types have been located in the Demonstration area. The work should be extended to the main forest areas, and such high yielding trees marked as seed trees for future regeneration as well, being supplied to the Geneticist for breeding and progeny testing. The wood anatomy of high and low yielders might usefully be studied in Wood Anatomy Branch to provide criteria for anatomical recognition of high yielders. Altogether, this work on resin tapping is soundly conceived and is being carried out well.

/_ have been obtained and all of these have application

It is, however, a minor forest products item closely analagous to the work on the tapping of Sterculia urens and Boswellia serrata for gum, which is being carried out in the M.F.P. It is suggested, therefore, that this work be transferred en bloc to the Minor Forest Products Branch, where it rightly belongs.

Other subjects dealt with in this section are introduction of poplar clones for testing in various centres in India and work on 'weedicides'. The poplar work is sound but, in the absence of any quarantine station for growing them in isolation, the danger of introducing virus diseases of poplars is a very real one. The Committee learnt that this mistake was made in England and over 60% of the poplar clones introduced have virus in them. Research is in hand there to determine the extent to which such viruses reduced growth rates.

Phenological studies:

These studies which go on for years, consist of collecting masses of figures that are only rarely made use of in practice. Furthermore, information collected at Dehra Dun, is unlikely to be of general application. The Committee feels that such studies should be confined to solving specific practical problems, e.g., timing of weeding or pruning operations, timing of seed collection or in genetic work, timing of pollination and grafting, and should be done regionally or locally as required.

Weedicides:

This work is being done on a comparatively limited scale. It might well be expanded to find effective and cheap weed killers that will reduce the cost of weed control in plantations.

Experimental Silviculture

4.7 The nomenclature of this and the previous Section is anomalous. There appears to be an anomaly in the naming of this previous section and this one, as the former also is engaged in experiments. The distinction sought to be made is that the programme of the Experimental Silviculture Section is primarily practical.

But it is far too heavy for the staff of two men and the section needs strengthening.

Routine trials of methods of raising species should continue, but care must be taken to concentrate on species of economic importance. Experiments concerning dates of sowing and planting, optimum size of planting stock should, as far as possible, be combined (including stump planting) into complex factorial experiments instead of being done separately. For different species, modern methods such as polythene bag planting should be included.

Of the many other items, most of which are useful, the following are of limited practical value and are out-dated:

- Types of planting bricks etc. (superseded now by polythene bags)
- Mulches - soil conditioners in the forest
- Debudding trials (have failed everywhere else)
- Trials with Gibberellic acid
- Eradication of Loranthus by tree injection.

Setting up small plantations of exotic pines is an item in the programme of this branch. This valuable as it is, is not enough. The whole work of introduction and testing of fast growing exotic and indigenous species needs to be formalised as an all-India co-operative investigation, preferably in collaboration with a suitable foreign institute like the Commonwealth Forestry Institute, Oxford, which is doing preliminary screening of species on the basis of known performance in different countries. Each State should classify its sites available for planting, and carry out Stage I. - Elimination Trials, and Stage II. Performance trials of recommended species according to standardised experimental designs. Seed supply may be organised by the C.F.I. - with the help of the F.A.O. Particular attention should be paid to pines suitable for growing at low levels in the tropics for timber or long fibred pulp wood. This project should have priority in the Silviculture programme and should be the sole job of one man.

A detailed programme on seed study has been introduced under the quinquennial programme and is realistic and practical. The work will ultimately lead to writing of a seed testing and certification manual. Work should also be done on correlating 'germination energy' and nursery performance. It is suggested that the seed and nursery work should be under a separate section.

The Experimental Silvicultural Programme needs to be revised and extended, as there are so many urgent problems requiring attention. The Staff needs to be strengthened. Coordination of silvicultural research with the States is of vital importance and requires frequent visits of the silvicultural staff of F.R.I. to see the work in the States and to arrange for cooperative trials.

Mensuration Section:

4.8 This Section deals with determination of volumes and increment of trees and crops, and provides the basic statistics for management. Steady work has been done on production of volume and yield tables for management purposes according to traditional methods. However, the new developments abroad, have not yet found a place in this Section. It is suggested that Yield Table Revision in species that already have adequate should be restricted unless developed on new lines, e.g. multiple tables for different thinning grades and tables for different levels of incomplete stocking. The introduction of the type of "Management tables" devised by the U.K. Forestry Commission, should be considered especially in connection with the management of fast growing plantation crops.

With the increase in plantation forestry for supplying industry there will be more need for rapid methods of accurate forecasting of yields from thinnings and from the final crop. ("Tariff Tables" may be appropriate here) so that the timing and size of industrial enterprises can be assessed in relation to the forest potential. Basic work on the effects of understocking on basal area and yield is desirable so that sampling assessments in plantations can be interpreted in terms of forecasted yields. More basic work on the best basis for controlling the heaviness of thinnings, and their optimum periodicity is wanted.

Another important matter is devising a simple method of 'dynamic sampling' (as defined by Dawkins Imperial Forestry Institute Paper No.34, 1958) - H.C. Dawkins "The Management of Natural Tropical High Forest" Chapter 4) to be used as a routine management procedure to determine the mean annual increment of natural forests under various systems of management. The data from such assessments will reveal how low production from our managed natural forests is in many cases and will indicate the scope for replacement by faster growing plantations. This applies not only to mixed forest but to all the naturally regenerated forests, especially sal.

The Mensuration Section still does its computations by hand. Such archaic methods should be dropped and all computation work should be done on a digital computer in the Statistical Section. The maintenance of increment plots and the collection of data is all done by the silvicultural field parties. The Committee learnt that it is contemplated transfer the Mensuration Section to the Statistical Section. But it does not recommend such a step because the maintenance of increment plots and the collection of data is all done by the silvicultural field parties. The statistician should be consulted regarding selection of plots and the design of sampling surveys etc., but actual collection of data and surveys should be directed by the Mensuration Section in the Silviculture Branch. The section also undertakes a considerable amount of statistical analysis of experimental data from other Sections of the Branch. This work can be done more efficiently by the statistician on a computer.

Forest Influences Section

4.9 This section was set up on the recommendations of the Champion Committee. The item in the report prepared for this meeting merely says "Studies in forest influences pertain to the effect of forests, micro-climate, hydrology, soil erosion and bio-climate".

There is undoubtedly great need for research on forest influences in this country. But the research should be on clear problems posed by the State Forestry Departments which may, if necessary, be done locally, in the areas where the problems occur.

Hydrological investigations are very difficult and, the Section needs some proper guidance for carrying them out. The proposed research project should be vetted by the Statistician.

Ecology Section.

4.10 The Section is making synecological studies in several of the major forest types in India by laying out transects, quadrats, etc., to determine the floristic composition, density, frequency, etc., of the components of the vegetation. Considerable amount of data is being accumulated with great effort and although it may be ecologically interesting, it is difficult to see what practical purpose will be served by it.

Autecological studies are also being made in pot culture with various species to determine nutrient requirements (5 species), moisture requirement (Sal) / (sal, teak, chir) diagnosis of mineral deficiency symptoms, nutrient uptake drought-resistance, light requirements, etc. It is well known that foliar analysis is very difficult to interpret in terms of nutritional status.

The programme of the Ecology Section needs careful scrutiny by a competent silviculturist to assess the practical value of the subjects studied. Many items which are of little practical value should be scrapped.

Soils

4.11 Unfortunately, the officer in charge of the Soils Section was away at the time of the visit of the Committee. The 19 items of the programme represent a wide range of activity. Much data on soils of different forest types has been collected and analysed and many hundreds of soils profiles have been examined. A few of these were examined in connection with problems, but the objects of most others were obscure. The work needs scrutinising to ascertain what items are of practical value and what are of the nature of "academic stamp collecting" leading merely to descriptive publications.

/_effect of competition by particular undergrowth species,

4.12 The criticism of the Champion Committee that the work of the Soils and Ecology Sections is largely theoretical and is of little practical value in the field still stands. The Committee feels that the programmes need careful scrutiny by a competent Silviculturist and it should be concentrated in future on problems posed by the State Forest Departments.

Fire Protection Research Section.

4.13 There have been repeated demands from the State Forest Departments for research into upto-date methods of fire protection, suitable for Indian conditions. The need for fire protection will become even more urgent when large areas of artificially created plantations of fast-growing species are established. It is, therefore, recommended that a Fire Protection Research Officer be appointed as the head of a Fire Protection Section. The officer may be sent for training to U.S.A. or Canada where advanced fire protection methods are now practised. The work of the Section should cover static fire defence systems and fire plans, fire hazards estimation, methods of fire detection and warning systems, the organisation and equipment and of fire fighting teams; ground communications, equipment and machines, use of aircraft, radio, etc. In view of the rapidly increasing areas of forest plantations, with risks, offers the creation of a Fire Protection Research Section is a matter of great urgency.

Documentation Section.

4.14 It has apparently fallen upon the Silvicultural Branch of the F.R.I. to do much wider documentation than is necessary for itself. With the appointment of a Documentation Officer in 1958; good progress has been made. The transfer of old 'ledger files' classified under the Howard System to the O.D.C. system is, however, unnecessary and should not be allowed to hold up other more important work.

Proposals for properly organised centralised documentation have been made in our review of the Central Library. (See paras 4.113 to 4.119). When these are implemented all that will remain in this Branch is

documentation of silviculture, with maintenance of classified information files both by species and by general subjects. In the interest of completeness and in order not to break the continuity of past practice, genetic information should continue to be incorporated in the silvicultural ledger files.

4.15 The recommendations to transfer the Plant Physiology and Forest Genetics from Botany to Silviculture and to Forestry Research respectively have been discussed, while reviewing the work of the Botany Branch.

General:

4.16 In discussions with the Chief Conservators of the State Forest Departments the complaint was repeatedly heard that the work of the Silvicultural Branch was becoming more and more academic, and was not sufficiently related to the practical silvicultural problems in States, and that Silviculturist and his staff were rarely seen in many States. Adequate personal contact between the F.R.I. and the State Forest Departments is particularly important in the field of silviculture, and the Committee would strongly recommend that such contact should be greatly increased.

4.17 After assessing the work dealt with in the Branch the Committee recommends that the Branch should be reorganised as follows:

(i) <u>Current</u>	<u>Revised</u>
(1) General Silviculture including resin tapping.	(1) General and Experimental Silviculture (without resin tapping). For this 2 or possibly 3 Research Officers will be necessary of whom one at least will be responsible for species trials.
(2) Experimental silviculture	(2) Seeds and Nurseries

- | | |
|---------------------------|---|
| (3) Mensuration | (3) Mensuration and Forest Inventories. |
| (4) Forest Influences | (4) Forest Influences |
| (5) Ecology | (5) Ecology |
| (6) Soils | (6) Soils Science |
| (7) General Documentation | (7) Physiology |
| | (8) Fire Protection Research |
| | (9) Documentation (Silvicultural and Genetics). |

(ii) The Silviculture Branch is the largest and the most important Branch in the Institute. It needs to be headed by an officer of very high calibre and competence. The Branch also needs strengthening to cope with the increased urgency of work and for maintaining closer contacts with State Forestry Departments and Research Organisations.

(iii) The Sections of this Branch should be reorganised so as to remove from it certain subjects that are not silvicultural and to enable the Silviculturist, who is very much over-loaded, to concentrate on his main job. Resin tapping research, which is not silviculture should be transferred en block to the Minor Forest Products Branch.

(iv) A major item of high priority should be the introduction of fast growing plantation species; especially pines and the establishment of co-ordinated species trials in the States over a wide range of sites. One Officer should have this as his sole responsibility.

(v) The programmes of the Branch are too large and contain many items of low priority which should be cut out.

- (vi) There should be a special section for Seed and Nursery work.
- (vii) The programmes of Soil and Ecology should be scrutinised and more attention should be given to problems posed by the State Forest Departments.
- (viii) Plant Physiology which hitherto belonged to Botany, should be transferred to the Silvicultural Branch so that it receives proper inspiration from practical silvicultural problems. Such laboratory facilities as are required, should be provided in the Soils Laboratory.
- (ix) General documentation should become a Central Library function, leaving silviculture with its own domestic documentation which should also serve the Genetics Branch.
- (x) The Silvicultural Branch should keep in much closer touch with the Forest Departments of the States and with the State Silviculturists and should give them all the necessary guidance, technical as well as scientific, so that the latter can implement their programmes in the field successfully. There should be adequate allocation of funds for travel which should be several times the present allocation. Regular programmes of touring should be planned so that all States are covered systematically.

(B) Botany Branch

(a) Systematic Botany, Herbarium and Botanical Gardens.

4.18 Formerly the most important activity of the Botany Branch was taxonomy. In the present organisation chart, the Committee was surprised to notice, that Systematic Botany does not appear at all, although the Forest Research Institute has one of the finest herbaria in the East and is very well equipped to carry on such work, for which there is an urgent need.

4.19 The Officer in charge of the Botany Branch is a Geneticist and it appears that Genetics has swamped other interests. The Systematic Botanist is designated merely as "Plant Introduction Officer". The Plant Introduction Section deals specifically with the introduction of such exotic forest trees as have a direct bearing on the industrial potential or are otherwise suitable for afforesting arid, saline, alkaline, water-logged or degraded areas. Fast growing exotics are in very great demand to cope with the increasing need of the paper, rayon, and other forest-based industries. Success of such introduced exotics depends on various factors like suitable soil, climate, silvicultural techniques, autecological studies, mensuration, etc. A successful Introduction Officer has necessarily to depend on co-operation from the Silviculturist, because none of these facilities are available in the Systematic Botany Branch. The Silviculturist is also simultaneously dealing with the introduction of exotics, seed testing, etc. and the various sections under him are already working under the Third Five Year Plan on the soils, ecology and other aspects of introduced species. Systematic Botany Branch has suffered much on account of its having been linked with other sections like Genetics, Plant Introduction and Physiology whose interests are different. Nor are this branch's best interests served by its being placed under a geneticist. The same mistake is likely to be repeated if Systematic Botany is again linked with Plant Introduction Section as the Officer in charge of this Section will have divided interest between Systematic Botany and Plant Introduction. He cannot be expected to give whole- / Introduction is a newly started section and requires more tender and whole-hearted attention to put it on a firm footing.

4.20 There is tremendous need at present for a revision of the forest flora of this country. The excellent work which Sir Joseph Hooker and his contemporaries did in the past has not been continued on the same standard and the Committee regrets to note the decline in the quality of work. Modern taxonomic methods have hardly developed at all, and the monographing of important families of genera has been barely touched.

Whole-hearted attention to either of these two main branches.
Plant

4.21 During the course of discussion the Committee got an impression that the Botanical Survey aimed to cover the whole field of systematic botany in India. This appears wasteful in view of the fact that there is a great potentiality for work on the woody species including bamboos in the Botany Section at Dehra Dun.

4.22 The Committee noted that the specimens which had been mounted by gluing and sewing did not have any paper pasted on the back with the result that the sewing tended to damage the specimen below. Such defects need to be remedied.

4.23 With regard to the herbarium, the Committee has noted with regret that very little new material has been incorporated in recent years. The staff members do not seem to have had any field work assigned to them officially. Adequate attention has not been paid to this Section partly because it was dominated by genetics and partly because there has been no encouragement for active systematic botanical work. The Botanical Garden is also under the charge of the Forest Geneticist.

4.24 Keeping in view the importance of the Systematic Botany Branch, the Committee now recommends that:

- (i) The systematic Botany Branch should be constituted as an independent branch and should be adequately staffed. The earlier position of the Branch as one of the most important branches of the Institute should be restored.
- (ii) The Branch Officer's title should be "Forest Botanist and Keeper of the Herbarium". It is essential that the Head of the Branch be a highly qualified Systematic Botanist and, in order to obtain the best man available, the post should be filled by selection and not merely by promotion. The Systematic Botanist should be fully conversant with the latest trends and techniques (including biometric methods) in systematic botany and adequate staff should be provided both in the higher and lower grades. The programme should concentrate on a revision of families of forest importance

(e.g. Combretaceae, Dipterocarpaceae, Sterculiaceae, Bambusae, and others). It should also work on the revision of regional forest floras.

- (iii) There should be at least two S.R.Os. for Systematic Botany plus one or more posts of R.Os. in addition to the Curator. One taxonomist, who was transferred to the Plant Pathology Section to work on mycorrhiza (a subject of which he has had absolutely no experience) should be retransferred to the Botany Branch.
- (iv) The Branch should also maintain Botanical Garden and Arboretum, and grow such species as are of botanical interest or of instructional value for Forest Colleges and University students engaged in fields of research pertaining to forest species. The Botanist should also engaged himself in propagating ornamental plants and maintain an ornamental plants corner in the Botanical Garden for the attraction of the large number of visitors to the Institute as also to provide attractive floral surroundings for the residents of the New Forest Estate. He should also help the Geneticist in the biometric determination of hybrids.
- (v) An arrangement may be made for collaboration with the Botanical Survey of India so that when the Botanical Survey is working in a particular area, as a rule the wood species are taken up by the F.R.I and the herbaceous phanerogams and cryptogams by the Botanical Survey.
- (vi) Regarding the herbarium, it is most desirable that this valuable collection should continue to be developed and properly heased. The rooms should be air-conditioned and the wooden cabinets containing the plants should be replaced by better ones that are insect and dust proof. The herbarium and the laboratories of the Botany Branch should be housed in a new building with air conditioning arrangements.

- (vii) The Botanical Garden and the Arboretum in the Institute Campus should be put under the Systematic Botanist under the direct charge of a qualified Curator. He should be a trained Horticulturist with knowledge of systematic botany. A degree is less important than practical experience. The post should be at the Research Officer level.
- (viii) A new and upto-date list of the plants in the Botanical Garden in the F.R.I. Campus should be prepared mentioning therein the months of flowering and of fruiting and not; 'hot' and 'cold' season, as these expressions are quite vague. The proper maintenance of the Botanical Garden and the labelling of every tree (unless several trees of the same species occupy adjacent positions or are planted in a row) are also necessary functions of the Botany Branch.
- (ix) Brandis' book on Indian Trees is now out of date and there is an urgent need for an up-to-date and illustrated handbook for the identification of trees, suitable for use by Forest Officers, Rangers and students.

(b) Plant Physiology Section:

4.25 The programme of the Plant Physiologist at Dehra Dun includes such items as the nutrient, hormone and water relations of trees. There is also some talk of work on fertilizer treatment of forests for improved production and on general nutrient requirements and uptake. These matters are in fact already being studied in the Ecology and Soils sections of the Silviculture Branch. Another item on the Plant Physiology programme is the flowering of forest tree species in relation to photoperiodicity, soil cultivation with special reference to natural regeneration of important forest trees, rooting of cuttings and the effects of hormones on growth of trees. These too are closely related to silviculture.

4.26 The Committee felt that there were no clear cut objectives behind the present programme of the Plant Physiologist who could in fact devote attention more usefully to the Physiology of seed dormancy, conditions of germination and the study of the factors affecting the formation of heartwood in trees of such species as Acacia catachu Pterocarpus marsunim, Santalum album. Other problems may emerge either from the Silviculture or Genetics Branch; the latter, for instance, may be concerned with the conditions affecting the early flowering of the trees propagated in seed orchards. In general, the plant Physiology Section should receive inspiration from practical silvicultural problems and should be able to make use of the laboratory facilities of the Soil Science Section, whenever required.

4.27 The Committee suggests that -

- /arise
- (i) The Plant Physiology Section, which is at present in the Botany Branch, should be transferred to the Silvicultural Branch since the problems that may /are more likely to be silvicultural and genetical than purely botanical.
 - (ii) The programme of the Physiologist should be drawn up in close consultation with the Silviculturist and the Geneticist and should be confined to problems that are of practical interest to those two Branches.
 - (iii) If the Plant Physiologist has to deal with any nutritional problems. These can be studied in collaboration with the Soils and Ecology Sections which has laboratory facilities.
 - (iv) The Physiologist should be moved out of the laboratory wing in the Chemistry Branch and should be provided with such laboratory facilities as he needs in the Soils and Ecology Section.

(c) Forest Genetics Section:

4.28 This Section which is at present in Botany Branch is concerned with improvement of the genetic qualities of the trees that are being used in plantations. At the present stage the work is mainly silvicultural. It consists of surveying of forests to find superior strains and individual plus trees, to assess these strains in terms of their value to forestry (this involves mensurational techniques) the registration of seed stands, their silvicultural treatment to eliminate inferior phenotypes and, in the case of plus trees, their vegetative propagation in seed orchards to provide sources of genetically superior seed. This preliminary phase of tree improvement is by far the most important at this stage of development and should be pursued with the utmost vigour. The Committee noticed that there was a tendency to spend too much time on the cytogenetics, induction of polyploidy, etc. The selection of species for tree improvement work viz. semul., teak, chir etc. was observed to be in accordance with the recommendation made in Professor Matthews' Report of 1961. It is, of course, too early to claim any results. Although some plus trees have been selected, there are many more fields to be surveyed for this purpose.

4.29 In view of the work expected to be undertaken by this Section, the Committee makes the following recommendations:

- (i) The Forest Genetics Section should be raised to the status of a Branch, and it should work in the closest collaboration with the Silviculture Branch. Forest Genetics is essentially a forestry subject, being primarily a specialised aspect of silviculture. Its problems arise largely from silvicultural experience and its work will be, to a great extent, dependent upon the assistance and co-operation of the State Silviculturists.
- (ii) At the present stage of development most of the time of staff of the Genetics Branch should be spent in the field and devoted to the Selection of seed stands and plus trees, the collection of material and the organisation of seed orchards and progeny trials.

- (iii) It is essential that the closest collaboration is maintained with the Wood Anatomy Section and with the Timber Testing and Cellulose and Pulp Branches so that the wood quality of selected trees is assessed right from the start. The genetics field parties must be supplied with the type of boring equipment necessary for the extraction of large cores of wood suitable for examination by the Wood Anatomy Branch.
- (iv) Certain aspects of genetics, viz., the inter-pollination of selected individuals in tree orchards to discover parents of good combining ability which produce superior offspring, and hybridization, should be given lower priority at this stage. For the first few years, the maximum attention should be concentrated on the selection of plus-trees and seed stands and the production of superior seed from them.
- (v) Work on certain species may be more efficiently attended to in the Regional Centres. These should be adequately staffed and equipped for this purpose.

(c) Wood Anatomy.

4.30 This Branch deals with work both in the field of original research and in providing services to the other Branches of the Institute. One of the burdens which the Branch has to bear is the amount of "police work" it has to do-over 6,000 cases are dealt with every year. This obviously interferes with the other regular work of the Branch.

4.31 Good progress is being made with the book on Indian Woods. Two volumes have already been published. The third volume on the Leguminosae will be sent to the press this year and the fourth and fifth volumes are expected to be completed by 1971. Valuable work is being done on the subject of variations in the properties of Indian woods in relation to growth. For instance, these studies are throwing up individual species with long fibres suitable for paper pulp. New techniques are being developed for the determination of the proportion of different tissues and other characteristics.

4.32 Studies on tension wood in Indian trees are also very important, and it is a subject on which little data is available. Tension wood is of common occurrence and is responsible for low grade quality of timber. Handbooks for the identification of woods of commercial value for the various States are well in hand. Those on Assam and the Andamans have been started and work for Bihar and Orissa is expected to be taken up shortly and completed by 1971. Anatomical features associated with the production of gums and resin in forestry are also of direct practical value. Work has already been completed and published on Boswellia serrata, Sterculia urens and Acacia senegal. Work is also being started on pines in connection with resin-tapping research. There are several other subjects of practical importance which are being investigated. The programme is a realistic one with a clear allocation of priorities.

4.33 The Committee, however, noticed that two items that had not yet been taken up were the Systematic Anatomy of woods of forest families and general showing similar structure and a study of the density and fibre characteristics as an index of wood quality. The latter is being taken up as a scheme under PL-430 and is expected to be done for chir, toon, Michelia and Garuga. The Committee observed that the wood collection was being steadily built up, but the lack of strong Systematic Botany Branch to collect herbarium specimens with linked timber specimens of trees of unrepresented genera and species has been a serious handicap. A scrutiny of the collection which is in progress has shown that the specific names are often not correct.

4.34 The Committee found the work in this Branch satisfactory. The possibility of reducing "police work" or of providing separate skilled staff to deal with it will relieve the Branch of work which hampers its research interests.

(D) Pathology

4.35 This Branch is under the direction of a Forest Pathologist and has a realistic programme of work. The work of this Branch was rather severely criticised by the

last Review Committee, but has improved during recent years. The Branch was recently visited by Professor J.S. Boyce, an eminent American Forest Pathology Consultant, who reported favourably on its activities.

4.36 The main items of work are:

- (a) Tree diseases;
- (b) Timber pathology;
- (c) Maintenance of Fungal Herbarium and cultural collection;
- (d) Teaching.

Under tree diseases, the carrying out of disease surveys is an important item. A scheme for the survey of the diseases of important local and exotic forest trees in India has been approved under a PL-480 grant, but it has not yet commenced. Other items on the programme are a study of the mortality of teak in nurseries and plantations and diseases of plantation crops and of fast-growing species. The subject of heart rot in sal has now been dealt with and scarcely deserves to be continued. Studies of the significance of tree mycorrhizas in forestry are of interest, but little progress has been made because of lack of a suitable worker. The five items of timber pathology on the programme are all very appropriate.

4.37 The Pathology Branch is not doing any work on virus diseases although need for this may arise in connection with poplar cultivation. It has been found in the U.K. that until a Virologist appeared on the scheme, no one appreciated how many virus diseases there were in forestry. The seriousness or otherwise of such diseases, however, is still unknown and it is an explored field of research. Special arrangements are proposed for investigating the "spike disease" of sandalwood which is almost certainly caused by a virus. (See paras 4.40 to 4.44 below).

4.38 With the establishment of the Genetics Branch there is a possibility that vegetative material may have to be imported into the country in large quantities. This is already happening in the case of poplar but there is no proper quarantine station in which this material can be safely screened and, if necessary.,

propagated to make certain that it does not carry dangerous diseases or insects. The history of the introduction of dangerous pests and diseases in other countries is convincing evidence of the need for such a station.

4.39 The Committee recommends that:

- (i) a properly organised quarantine Station such as that operated by the East African Agricultural and Forest Research Organisation in Kenya, should be established urgently. It can best be established either by the Forest Research Institute under the Pathologist or else in conjunction with any similar station that may exist for agricultural material.
- (ii) The services of the Systematic Botanist transferred from the Botany Section to this Branch for work on mycorrhiza should be replaced at the disposal of the Botany Branch where he will be more usefully employed.
- (iii) The compilation of the proposed book on 'Indian Forest Pathology' should be pursued as a priority item as the book will be of great value to Forest Officers, the Forest Colleges and Research workers alike.

(E) Sandal Spike Disease Research

4.40 This lethal disease of the sandalwood tree which appeared about the beginning of the century causes great economic losses in the sandal growing areas of Mysore, Madras and Kerala. Research to control it has been going on for the past 35 years or more and, though a great deal of information has been amassed about the disease, the causative agent has not yet been isolated. Until that is done and until the method of spread of the disease is worked out, there is very little hope of developing control measures. The matter is of such great economic importance to the States concerned that the Committee went at length into the work that is being done now and the arrangements that are considered necessary for solving this serious problem.

4.41 The disease is considered to be of viral origin because no casual organism could be found associated with it and it was experimentally transmissible by grafting and budding. It has been suggested that a leaf hopper Jassus indicus could transmit the virus, but sufficient proof of this is lacking. Some information on the Physiology and bio-chemistry of spiked sandal trees has been gathered, but this has little value in devising control measures for the disease. It appears to be clear, therefore, that much of the information on the disease has to be gathered de novo.

4.42 During the 1930s the following points were noted about the disease:

- (i) While it spread steadily in a direction downwind it also spring up in new centres many miles away.
- (ii) Sandal growing in dense lantana areas, is usually healthy until the crown of the tree has emerged from the lantana thicket after which a very high percentage of trees are immediately attacked.
- (iii) The disease is transmissible by grafting.
- (iv) The symptoms of the disease often appear upto four years or so after infection, but if infected trees are lopped the new shoots show the disease immediately. This lopping technique is also used to force out the symptoms in virus disease of cocoa.
- (v) Spiked material contains intra-cellular bodies typical of certain types of virus disease.
- (vi) Other experiments showed that the disease could be definitely transmitted by small insects from one spiked sandal to another, though there was great difficulty in getting transmission in this way. Many hundreds of insects were screened with negative results, but two insects, Moonia albimaculata, and Jassus indicus were suspected as possible vectors.

(vii) Attempts at controlling the disease by lopping sandal trees and removing all those that showed the symptoms besides an unaffected belt had only limited success, and suggested that if the disease was a virus disease, there may be a reservoir of infection in some other host plant which being the normal host of the virus shows little or no external symptoms. (Dr. Tinsley, an experienced virologist, had said that sandal spike disease symptoms are rather typical of a virus that had got into an unaccustomed host).

(viii) Once a tree has developed the symptoms, it dies and there is no hope of its recovery. Trees having somewhat similar symptoms have been known to recover through application of fertilizers, but in such cases no transmission of the virus by leaf grafts has been demonstrated.

(ix) A large amount of information has been accumulated on the relative susceptibility or resistance of sandal to spike disease infection when grown on a large number of different hosts. Lantana made the sandal highly susceptible. Cassia siamea conferred apparent resistance though not complete immunity.

(x) A considerable amount of biochemical and physiological work has been done but this has not so far lead to a discovery of the cause of the disease or to any measure of control.

4.43. The Committee considers it necessary to apply modern virological techniques to isolate the virus, purify it, determine its diagnostic characteristics and to explore the possibility of culturing it on other easily handled plants. Then the virus should be looked for in other plants commonly associated with sandal in spike disease areas. Considering the nature of propagation of the sandal tree, the following methods of control of the disease are suggested:-

- (i) To test large populations of progenies for resistance to the disease in the hope of isolating resistant individuals. Once spotted, these could be multiplied vegetatively or through seed, preferably the former. The above method would presuppose a quick, easy and sure method of experimental induction and diagnosis of the disease.
- (ii) Use of systematic and other insecticides to kill the vectors of the disease, if any. Vector transmission of the disease will have to be established and the vector or vectors identified and their habits studied thoroughly. The epidemiology of the disease will have to be studied in detail.
- (iii) Transmission: From the symptomatology of the disease and the fact that it spreads in nature it appears to be beyond reasonable doubt that the disease is viral in nature. Since sandal propagates itself through self-sown seed, spread of the disease through vegetative planting material is ruled out. Seed transmission also appears unlikely. Some other agent of spread will, therefore, have to be looked for. The most likely agent would be an insect vector or a soil-borne agency like a nematode or fungus. It is not unlikely that host plants of the sandal tree might establish organic contact between diseased and unhealthy trees and thus form a natural bridge through which the virus may travel.

If a vector is discovered it could be multiplied in the laboratory and used for disease transmission to experimental plants for testing their reaction to the disease. If the efficiency of the vector is not sufficiently high or if its rearing presents unusual difficulties, then grafting and budding techniques will have to be perfected to transmit the disease to large populations.

- (iv) Index hosts: Hosts which react with quick development of symptoms will have to be isolated from plants belonging to the Santalacene or other families. Many hosts

like Vinca and Zizyphus are believed to be susceptible to infection by the virus. A herbaceous host easily grown in the glass house would be ideal, Index hosts would be useful for checking presence of latent or masked infections.

- (v) Control by insecticides: A thorough knowledge of the pattern of spread of the disease in nature and association of this pattern with vector migration and multiplication would help in planning the strategy of control of the disease with insecticides. Disease of trees like the swollen shoot disease of cocoa have been experimentally controlled with application of systematic insecticides to the soil, after studying the pattern of migration of the insect vector.
- (vi) Serology: Preparation of an antiserum to the virus could be attempted, but this may be difficult because of its non-sap transmissible and unstable nature. If, however, an antiserum could be successfully produced, it could then be used for indexing latent masked or incipient infections.
- (vii) Chemotherapy: Chemotherapy though still in an experimental stage, could be tested for control of the disease.
- (viii) Use of mild strains of the virus: Cocoa trees experimentally infected with mild strains of the swollen shoot virus have remained free of infection by the severe strain. Such an approach could be made to the sandal spike problem, but this would depend on isolation of such mild strains.

4.44 Sandalwood constitutes precious natural wealth of the country and earns valuable foreign exchange, and the amount of loss each year is so large that no expense should be spared in making a really effective attack on this problem. In the light of the above suggestions, the Committee, therefore, strongly recommends that:

- (i) The work needs to be put in the hands of a competent and experienced plant Virologist. At present there is no one either at Dehra Dun or at any of the Regional Centres located at Bangalore and Coimbatore who is capable of directing the work. The staff required will be a well qualified Plant Virologist, a Forest Ranger or Forester with horticultural or nursery experience to run the field stations; a Botanist, preferably one well acquainted with the flora of the types of forest in which sandal grows, and an Entomologist - all working under the Virologist.
- (ii) This work has to be on a completely separate and different footing. The Virologist will have to be very well qualified and experienced in his subject, and should be of the grade of P.S.O. In view of the nature and character of the work, it is suggested that Bangalore would be a suitable centre, as much of the equipment will be available at the Indian Institute of Science, where also research in other closely associated disciplines provides excellent opportunities for reference and collaboration.

(F) Forest Entomology:

4.45 There are over 1,500 species of insects known to damage forests and, forest products. The functions of this Branch are stated as follows:

- (i) To conduct fundamental and applied research on ecology, biology, epidemiology, survey and pest situation, systematics and control of insect pests causing damage to standing trees, plantations, nurseries, felled logs, converted timbers, finished products of wood-based industries, raw materials for pulp and paper industries, etc.
- (ii) to collect, codify and maintain all information pertaining to forest insects so as to serve as a central bureau of information on the subject,

- (iii) to advise the State Forest Departments on suitable methods of control of insect epidemics in forests and in plantations; and
- (iv) to advise wood-based industries, Government Departments and private individuals on the control of insects affecting timbers and other forest products.

Basic to these is Systematic Entomology involving the identification of noxious insects and the maintenance of a reference collection. This used to be a major activity but there is at the moment no Systematic Entomologist.

4.46 The current programme includes the following items:

- (i) Protection of newly felled timber, logs and converted timber from damage by insect borers. This is a matter of high priority because such damage causes serious wastage in timber. It deserves more active attention than it is receiving at present.
- (ii) Epidemiology, Ecology, Biology and control of forest insects.

Work on the epidemiology of the insects attacking teak has been going on for over half a century. No attempt seems to have been made to estimate the damage these insects cause or how important this project is. This cannot be done effectively at Dehra Dun owing to its distance from the plantations of teak and should be made a regional research commitment at Coimbatore.

- (iii) Sal-heart wood borer

This insect has also been studied for many years. The only control measure

so far devised is by trapping in felled trees, which attract the insects, and collecting them by hand. The Chemistry Branch is reported to be conducting investigations on the attractant.

(iv) Deodar defoliator and spruce bud-worm

These are new projects. The deodar defoliator is an important pest, destroying many plantations. So is the spruce bud-worm in Himachal Pradesh. The Committee feels that the extent of damage from these should be determined in order to assess the importance and priority of these investigations. As spruce is not planted, it seems doubtful whether the bud-worm attack is economically important.

(v) Sal seedling mortality

After assessing the progress made in this programme the Committee suggests that the importance of this item should be determined.

(vi) Studies of the life history of forest pests and their parasites, predators and pathogens

This is an insectary study with 200 cages of infested material under observation.

Of the other items of the Programme, termite damage to Eucalyptus plantations is important, but it has been worked out in detail abroad and satisfactory control measures have been devised. Work here is said to be concentrating on the effect of soil structure on the efficacy of insecticidal treatment of the soil.

4.47 The study of insect pathogens was discussed. While the control of insect pests through their diseases might be practical and might obviate some of the undesirable side effects of insecticidal control, it is a field of study that is relatively.

undeveloped. A little work on the fungal pathogens of insects is said to be going on. A more promising field, offering greater opportunities for practical control measures, is probably the study of virus diseases of insects. This however is a very specialised sphere of work, requiring specially qualified staff and expensive equipment. It should not be started until a competent Virologist is available.

4.48 The Committee noted that no mention was made in the programme of the mahogany and toon shoot borer (Hypsipyla robusta). This is an important pest affecting not only mahogany and toon plantations, but also other exotic Meliaceae that may be introduced. The Committee feels that this may be suitably taken up on the programme of the Southern Regional Station.

4.49 In discussion it was mentioned that there is no proper quarantine station or organisation for ensuring that noxious insects or pathogens are not introduced into the country from abroad. This is a matter that should be looked into in collaboration with the Pathologist - (See paras 4.38 and 4.39 recommendation (i)).

4.50. The Committee was pleased to note that active work was in progress on the taxonomy, biology and ecology of termites. This includes their control by sterilization of soil with insecticides and other methods. There is a PL-480 scheme for determining the natural resistance of woods to termites by accelerated laboratory tests, which is producing useful information regarding timber suitable for use in the ground.

Systematics of forest insects.

4.51 The Committee was disturbed to note that there has been no Systematic Entomologist at Dehra Dun since 1956 when the incumbent of this post was transferred to Coimbatore. Identifications have to be carried out as far as possible by the existing staff and the continuing work on studies of the immature stages of Lepidoptera and Coleoptera have come to a halt. Practically no work is being done on the other items under this head.

Preparation of Handy Reference Guide on Forest insects for use by Forest Officers.

4.52 Work on this is in progress. One publication on sissoo insects has been produced; the next one is to be on the insects of teak. A note on the insecticidal control of the defoliators of Ailanthus has been written but not published. In view of the importance of this species for paper pulp, it is desirable that this should be issued quickly.

4.53 The Committee recommends that:

- (i) The staff of the Entomology Branch should be strengthened by the addition of a good Systematic Entomologist and more field entomologists, some of whom may be stationed at regional centres. The post of the Systematic Forest Entomologist which has been lying vacant for the past eight years must be filled as quickly as possible.
- (ii) The Committee noted with dissatisfaction that very little field work has been done by this Branch in recent years. This is said to be due to lack of funds. It is essential that adequate funds be provided for this purpose for both the Central and Regional entomological staffs so that field investigations on outbreaks of insect pests can be carried out expeditiously.

(G) Minor Forest Products Branch

4.54 The richness of Indian forests in minor forest produce is exceptional and considerable revenue is obtained from this source. The growth of many forest products which are marketed in a small way could be increased by cultivation while, at the same time, there are many others that exist but for which uses have not so far been discovered. Research into the possibilities of using products that are at present wasted in large quantities is desirable but care must be taken that time and money is not spent at Dehra Dun on products

that are never likely to be economic. The programme of the Minor Forest Products Branch is very large and includes a number of such products and it needs careful scrutiny to eliminate uneconomic items and reduce it to reasonable proportions.

4.55 The work needed for each kind of product falls under the following heads:

- (i) Identification of products;
- (ii) Survey of resources;
- (iii) Assay of the active principle (where appropriate);
- (iv) Examination of present methods of collection, preparation and marketing;
- (v) Study, under the following heads of the possibilities of cultivating the plant and increasing its production
 - (a) methods of propagation;
 - (b) trials on various sites to determine those which give the best results;
 - (c) determination of yields under cultivation;
 - (d) perfection of methods of harvesting and preparation;
 - (e) organisation of marketing.
- (vi) Economic assessment of the project and where applicable, development of industrial uses, etc.)
- (vii) Carrying the investigation to the semi-commercial stage, and
- (viii) Dissemination of information.

4.56 The main subjects under study at present are:

- (i) The cultivation and exploitation of the following economic plants:
 - (a) Ocimum kilimands charicum for camphor,

- (b) Rauwolfia serpentina for its drug content;
- (c) Rauwolfia canescens for similar purposes;
- (d) Citronella grass, two species;
- (e) Dioscoria deltoidea for its tubers;
- (f) Valerian.

The last two are new projects. Suggestions for work on some further species have been made. There are also proposals for a survey of commercial minor forest products including plants that produce drugs, tanning materials, gums, mucilages and pectines, resins, essential oils, fibres and flosses, oils and fats. There is also an old project on charcoal bricketting which should really be dropped now as this work has been shown to be uneconomic. Publications in hand are the second volume of the monograph on poisonous plants which has now been handed over to the Indian Council of Agricultural research, and a publication in the series on Aromatic Plants of India. Furthermore there is work on the tapping of Storculia urens and of Boswellia serrata for gum and oleoresin, work is also in progress on the introduction of Singapore or Malayan canes into India. This work, seems to have become of rather doubtful utility now that so much cane is being replaced by plastics. Finally, the Branch is responsible for the compilation and dissemination of information on all minor forest products. This is a very large and important part of the work of the Branch.

4.57 The Committee feels that the size of the programme is quite unrealistic in relation to the man-power employed. If, for instance, a minor forest product should become of extensive commercial value, (as has happened in the case of rubber, tea, cashewnut, tung-oil, lac, cinchona, etc. in the past), more than one research worker may be required on such a single product's.

4.58 The sanctioned staff of this Branch at present consists of one Officer in charge and three Research Officers of whom one post was reported to be lying vacant. Much of the time of the members of the Branch is spent in answering enquiries and little time is left for research. One Research Officer cannot effectively deal with more than two or three products in the initial stages and as soon as the economic importance of a project is established, more than one worker may be needed for it.

4.59 Chemical analysis of minor forest products is being done separately in a small laboratory by a member of the Minor Forest Products Branch. This is quite unsatisfactory as one man cannot have the knowledge or the facilities for analysing the very wide range of products that may occur. These facilities exist in the General Chemistry Branch of the Institute and arrangements should, therefore, be made to have the minor forest products analysis work done in that Section.

4.60 The Committee recommends that:

- (i) The programme of the Branch should be reduced by the elimination of a large number of less important projects.
- (ii) The staff of the Branch should be strengthened to enable it to deal adequately with the remaining programme.
- (iii) The chemical assessment of the active principles in minor forest produce, either natural or cultivated, and the development of economic methods of extracting of essential oils, drugs, etc., should be done in the Chemistry Branch of the Institute in close cooperation with the Minor Forest Products Branch and the programmes of the two Branches should be intimately coordinated. Special staff for dealing with the minor forest produce as a priority assignment should be maintained in the Chemistry Branch.
- (iv) Research on the tapping of Sterculia urens and Boswellia serrata for gum may be intensified as these are important economically.

It is suggested that the analogous work on tapping chir pine for resin should be transferred from the Silvicultural Branch to the Minor Forest Products Branch where it rightly belongs.

- (v) Work on those minor forest products which are of high value or which have been earning foreign exchange by way of imports should be intensified. There is considerable scope for research to improve the availability and quality of these plants, particularly those which have or can have a foreign market.
- (vi) There should be maximum contact and collaboration of this Branch with the Central Indian Medicinal Plants Organisation and the Central Drugs Research Institute and other research organisations engaged in the field of improving quality of medicinal plants, as also with the profession, and pharmaceutical and chemical industries.
- (vii) The Minor Forest Products Branch should have its own facilities for the propagation, multiplication, testing and distribution of seed rather than centralising this work in the Genetics Unit as at present. Should there, however, be an important product found to be worth attention for selective breeding the Geneticist may be consulted; and even then it may be desirable for this Branch to do the actual work with the guidance of the Geneticist.
- (viii) With regard to the survey of resources of minor forest products this Branch cannot be expected to do this by itself. It may, however, be possible for this Branch to organise it through the State Silvicultural Branches; provided this Branch can in consultation with the Statistician lay down a suitable sampling survey procedure in each case after examining the situation. On the ground.

- (ix) The importance of work on the introduction and cultivation of canes should be reviewed in the light of their recent replacement for many purposes by cheap plastic materials.
- (x) Steps should also be taken to develop essential oil bearing plants yielding perfume and flavouring materials, which are at present imported from abroad.
- (xi) Facilities for the documentation and for the dissemination of information about the full range of minor forest products in India must be provided on a priority basis. It is essential that this work is not allowed to fall into arrears and that it is done as completely as possible. This work must not be allowed to suffer on account of the needs at the rest of the research programme.
- (xii) Minor Forest Products Branch, in view of its close association with Silviculture should be transferred from Forest Products Division to Forestry Division.

(H) Statistical Branch

4.61 One of the main responsibilities of the Statistical Branch is advising research workers in various fields of forestry and forest products, on designing of experiments and on appropriate methods of collecting and handling their numerical data. The Branch thus takes an active part in and shares the scientific work of many other branches of the Institute by helping them in planning and interpreting their research experiments. In addition, the Branch also serves as a centre for research and training in statistics. It holds refresher courses for forest officers at intervals.

4.62 This is, therefore, a key branch concerned with the State Forest Departments and the research officers all over India. There is good liaison between the Statistician and other Branches, though those whose work is largely routine testing such as Timber Mechanics and Wood Seasoning, use it less than they ought to.

4.63 One of the Statistician's most important functions is the vetting of experimental designs at the commencement of an experimental project. Some 93 experimental designs have been dealt with in the past 7 years. In this matter it is consulted by research officers both in the institute and in the States. Three States, Bihar, Uttar Pradesh and Maharashtra have their own statisticians who are in constant touch with the Branch at Dehra Dun. Contact with other State Silviculturists is good, mainly through the Central Silviculturist, and the Statistician tours regularly to see the problems in the field. This important matter of liaison with State research workers depends to a great extent on personal contacts which can only be achieved by touring and personal discussion of problems on the spot. Good personal contact is maintained with five or six States. With others it needs to be developed.

4.64 There is still something to be desired in the relations between Statistical Branch and some Branches. Routine testing in some Branches is continuing along old methods, virtually unchanged for a quarter of a century or more. There are deficiencies particularly in the selection of material in the forest for testing, and proper sampling procedures are not being followed. The work is often statistically inefficient in other ways. The Statistician should be in a position to examine all the procedures in the Branches for collecting material and determining its properties, and to advise Branch Officers on improved procedures and on the ways in which increased information of value can be extracted from the data collected. Vast quantities of data have been accumulated over many years, which need critical analysis - and this, while virtually impossible by manual methods, could well be done by a digital computer.

which

4.65 The statistician runs a computing service, with three officers and 11 computers, slogging out statistical analysis on hand machines. In addition, several branches have their own computing staff. Data from 120 experiments were analysed in the last seven years. In addition to analysis of experimental data of a wide variety and the compilation of various management tables, the surveys of forest resources.

will constitute a big new load. Data received from the States for computation also cannot always be dealt with owing to limitations in computing capacity. In such cases the present practice is to do a model computation on part of the data and send it back to the States for them to complete. But the States are often not equipped for this and frequently good data are wasted through failure to carry out the computations. The installation of a digital computer will rectify this.

4.66 The mensuration section in the silvicultural branch collects data from permanent increment plots and other sources for the production of volume tables, yield tables, stand tables, etc. The measurement and maintenance of the plots and all the field work should remain with the Silvicultural Branch, but computation should be done by the Statistician. There is great scope for the introduction of up-to-date, methods of mensuration and computation, for which the assistance of the Statistician should be sought.

4.67 The Committee was surprised to find that Institute of this size handling so much data of such variety did not yet possess a digital computer. Even a comparatively small research station like the U.K. Forestry Commission Research Station has had its own computer for a number of years. The F.R.I. is many times larger and the need is correspondingly greater. A suitable digital computer should be installed without delay. The Statistician is already trained in using such computers; and if it is possible to get one on a training programme, the cost will be greatly reduced. The computer will serve all Branches and States.

4.68 Another of the Statistician's functions was the vetting of experimental results before publication, to check that the conclusions drawn from the figures are valid. This function used to be performed by a Vetting Committee of which the Statistician was a member, but since the Directorates of Divisions were established, vetting of such material by the Statistician now does not take place. This position should be remedied.

4.69 The maintenance of general forest and industrial statistics leaves a lot to be desired. Such data as

are available are variable in accuracy and completeness and sources need critical examination. Repeated requests for adequate surveys of resources of different kinds whether they be of timber, particular kinds of pulp-wood or minor forest products have been made from time to time and the need for such surveys was amplified in evidence received by the Committee. The Committee learnt that organisations for such surveys are being set up in the States; but it is important that the sampling schemes for such surveys should be vetted by a Statistician and that the data be processed by him on the computer so that the reliability of such surveys can be assessed statistically at Dehra Dun. The sampling methods as well as the organisation of computing could well be the Statistician's responsibility.

4.70 The Committee recommends:

- (i) that the vital importance of the Statistical Branch to the Forest Research Institute be recognised by suitably upgrading the post of the statistician.
- (ii) that a suitable computer be installed early in the Statistical Branch at the Forest Research Institute; and
- (iii) that all Branches be encouraged to consult the statistical Branch and make use of its services to the maximum possible extent.
- (iv) that, as the computer should be in air conditioned accommodation, the whole Statistical Branch with its computer should ultimately be accommodated along with the Herbarium in the new air-conditioned building. The provision of the computer should not, however, be held up pending erection of this building.

(f) Forest Economics.

4.71 The Committee noticed with concern that Forest Economics was missing from the activities of the Forest Research Institute and Colleges. Forestry elsewhere has

already entered the economic sphere of a country, so much so that sooner or later the task before the foresters will be to fit forestry in the framework of Forest Economics. The conventional subject of Forest Valuation does not even touch the sphere of Forest Economics as has by now come to be understood in advanced countries. In modern times, the forestry organisation in a country cannot be regarded as complete without having in it a section dealing with demand studies, consumption studies, market situation, market developments, forecasting, costs, returns, etc. It is only when the forestry organisation is thus equipped that it is in a position to conduct, or to interpret Timber Trends and similar studies, as aids in prospecting industries. Future forest officers of the country too must have some background of this important subject. A branch of Forest Economics at the F.R.I. and Colleges is urgently needed:-

- (a) to teach this subject to the students of the Indian Forest College;
- (b) to collect basic data on consumption, demand, market, costs and returns etc., in respect of forest products and forest industries;
- (c) to evolve standardised techniques for collecting the data for (b) above for periodical publication;
- (d) to investigate and advise on the economic impact of various management methods and changes thereof.

There are a number of other problems in forestry where decisions resting on cost-benefit analysis by linear programming or other methods may be made, and which would suitably be dealt with by the Forest Economist.

4.72 Looking to the importance of the subject and the considerable lee-way to be made, the Committee recommends that a separate Branch for Forest Economics be opened. The Officer-in-Charge should be a senior forest officer specially trained in Forest Economics.

A suitably qualified Forest Economist should be appointed as soon as possible. He should be closely associated with the Statistical Branch.

(v) Logging Branch

4.73. This Branch has been in existence for the past eight years. Logging is a very important subject. In European countries it often forms more than a quarter of the whole programme of teaching and research. In Dehra Dun, at present, it is a minor branch, in terms of manpower and importance, under the Director of Forestry. It got off to a good start after the visit of Dr. Winkelman and has been carrying on under its own momentum ever since.

4.74. The programme is still at a very elementary level, and is mainly concerned with introducing such basic matters as the proper use and maintenance of hand-tools by methods that have been current in Europe for 30 years or more. Useful work has done in collecting data to prove the wastage caused by inefficient logging and the enormous savings that can be realised by introducing modern techniques. The task of getting better methods adopted when exploitation is in the hands of contractors is a formidable one. Much of the work of the branch at the moment is concerned with introducing into the country methods long ago established as good practice in Europe.

4.75. The limited progress made by the Branch in the last seven years is partly due to shortage of manpower and of funds. One thing which has adversely affected progress more than any other, is short-term deputation of officers. If anything worthwhile is to be achieved the whole concept of the Branch and its activities needs re-thinking. The arrival of the F.A.O. Team with nearly 10 European experts and 20 Indian counterparts for execution of the project of Logging Training in India will, the Committee feels, go a long way towards solving these problems. The closest collaboration between the Logging Branch and this Team will throw up new problems and will activate the future programme of the logging Branch.

∠ is essential. It is certain that the work of the Team

4.76 The Committee learnt that efforts were being made to introduce some modern logging tools, in use in some of the European countries mainly Sweden, in the logging operations in India. These tools mostly comprise saws, axes, wedges, falling and cutting tools. The 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. A number of men from the States are also being trained in the use of modern tools. The Committee also understood that efforts were being made by the Institute to get these modern tools copied in the country. Recently mechanical means for improving harvesting of forests have been adopted in Punjab and Himachal Pradesh.

4.77 Keeping in view the importance of this Branch, the Committee would suggest that:

- (i) The Logging Branch should, in the course of time be expanded and a separate section on work science studies added.
- (ii) The short-term deputation of officers as Branch Officers to such important branches should be avoided. Forest Officers who have been specially trained in logging should have time to become experts in their subjects and thereafter to contribute to research and development of new techniques.
- (iii) In the interest of the advancement of logging science, this Branch must keep itself up-to-date with the literature, much of which is in German and Swedish. All the necessary periodicals must be taken and translation facilities provided (See note in this connection on Central Library).
- (iv) There is an urgent need for intensifying research on logging tools and other mechanised means for improving timber extraction as may be best suited to Indian conditions.

- (v) A separate Mechanical Development Section should be established for the purpose of developing machines for the mechanisation of all types of forestry operations from nursery to final felling. In some cases it may be possible to adopt existing machinery and in others it may be desirable to develop new types of machines. This Section should investigate the possibility of manufacturing all kinds of equipment for the mechanisation of forestry operations in India.

(K) Chemistry of Forest Products Branch.

4.78 This Branch deals with the chemical constituents of wood, leaves, fruits, seeds and other parts of trees, shrubs, grasses and herbs from the forest that might form useful minor forest products or by-products of the timber industry. The work falls under six main heads, namely;

- (i) Essential oils;
- (ii) Carbohydrates;
- (iii) Oils, fats and waxes;
- (iv) Dyes and tans;
- (v) Drugs and insecticides;
- (vi) Wood chemistry.

There are in addition, a few miscellaneous investigations.

4.79 The Committee found that the programme of research work left much to be desired. Attention seemed to have been focussed on problems of relatively minor significance. Some items were of long-standing and should have been concluded many years ago. In some cases, after preliminary investigations had shown promise, further work on extraction on a larger scale was continued even though it was clear that the low availability of raw materials was likely to preclude economic working. In fact the main criticism by the Committee of the work of the Branch as a whole was that it was out of touch with economic realities.

4.80 The Chemistry Branch was seriously short of space for its wide range of activities. A whole laboratory wing had been taken away from the Branch and given to the Physiologist who could, in the opinion of the Committee, do his work elsewhere in much less space. The library in the Branch was everflowing with books and old periodicals.

4.81 The Branch is well equipped with pilot plant for semi-commercial scale testing of methods of extracting minor forest products. This plant includes steam distillation and fractional distillation units, a solvent extraction plant, centrifuges and a laboratory paint mill. The appearance of this equipment gave the impression that it was very little used. One reason for the non-utilisation of this equipment as the Committee observed, was that the Chemistry and Minor Forest Products Branches were separate though they are working on parallel lines. It was noticed, for instance, that in the investigation of the extraction of camphor from Ocimum, the Minor Forest Products Branch has independently been developing suitable cheap distillation apparatus for forest use.

4.82 The Committee noted that formerly all the chemical assessment of minor forest products was done in the Chemistry Branch but recently the Minor Forest Products Branch had been doing its own analysis because of complaints that the Chemistry Branch gave their requirements low priority. The Minor Forest Products Branch had set up a separate small laboratory for this purpose. The Committee feels that the technical knowledge in the Chemistry Branch in handling different kinds of analysis, e.g., for essential oils, alkaloids gums and colloids, dyes, tans, etc. clearly makes it the most suitable place for such work. In addition, there is no clear division between the minor forest produce being handled from the chemical angle in the Chemistry Branch and that in the Minor Forest Products Branch. The function of the latter is the study of the availability, propagation, cultivation, collecting and marketing of minor Forest products. The Chemistry Branch already spends fifty per cent of its time in analysing materials, including minor forest products, sent to it by State Forestry Departments, Government Departments and private industries. The Committee observed that the Minor Forest Products Branch was not kept informed of the results of the analysis.

4.83 In view of this State of affairs the Committee makes the following recommendations:

- (i) In order to use the staff and equipment of both the Chemistry of Forest Products and Minor Forest Products Branches more effectively, it is important that the chemical aspects of minor forest products research should be dealt with in the Chemistry Branch.
- (ii) There must, therefore, be intimate collaboration between the resources, cultural and marketing aspects of minor forest produce (the M.F.P. Branch) and the basic chemical research behind it. The programmes of both these Branches should be coordinated.
- (iii) The Chemistry Branch should do the chemical analysis for the Minor Forest Products Branch. The chemical laboratory run by the M.F.P. Branch should be closed down and the chemist transferred to the Chemistry Branch which, with this and further extra help, should give priority to the analysis needed by the M.F.P. Branch.
- (iv) The laboratory wing at present occupied by the physiologist should be returned to the Chemistry Branch and alternative accommodation arranged for the Physiologist.
- (v) The Chemistry Branch Library needs to be rationalised. As soon as a new library is built, all the old back numbers of chemical journals should be transferred to the stock room of that library (card indices of important articles being kept in the Chemistry Branch) and the library reduced to a small up-to-date working library.
- (vi) The programme of the Chemistry Branch needs critical scrutiny to make sure that the limited resources of the Branch are concentrated on items likely to be of the greatest economic importance.

- (vii) In view of the wide scope of useful work that could be, and should be, done by this Branch a larger allocation of funds is necessary particularly as the cost of chemical reagents and solvents has increased to such a great extent recently. It is impossible to do very much on a budget of only rupees 15,000 per year. More staff is also needed to cope with the large amount of routine analysis and to provide the necessary analytical service to the Minor Forest Products Branch.

(L) Cellulose and paper Branch

4.84 The development of a successful process for the production of paper pulp from bamboo was accomplished over twenty years ago by the Cellulose and Paper Branch of the F.R.I. Since then bamboo has served as the main raw material for the rapidly expanding paper industry in India. There is a cess of 25 paise per ton of paper produced by mills in the country, and the amount realised is handed over to the F.R.I. for further research work on raw material for the paper industry. Unfortunately the initial lead in this research has not been maintained and spokesmen of the paper industries openly voiced their discontent about the inadequacy of work done by this Branch at present. At the same time, opinions are expressed that the industry would not mind if the cess is increased substantially, if thereby more integrated research work can be undertaken by the F.R.I. for solving the raw material problems of the industry. This situation is a result of the fact that the Cellulose and Paper Branch has confined itself to carrying out pulping trials only with different species of hard and soft woods that can be grown in our forests, as well as with grasses. While some work was done on bagasse, this has not been pursued vigorously in the belief that Sugar Mills need it as a fuel, and would not spare the same for use as a raw material for pulping.

△plant

4.85 A paper machine with a daily capacity of six tons was acquired as a Pilot for the Branch over 10 years ago. Until the current year; it has never been available for production trials. The Committee

was informed that so far, nine Committees have examined the possibility of utilising this plant, and come to the same conclusion that in order that the plant should be available in working condition for research and training, it should be operated as a regular production unit. The Committee further learnt that recently in February last on the advice of the Thirumala Rao Committee sanction for an expenditure of rupees five lakhs had been conveyed to the F.R.I. for expanding the capacity of the existing two-ton-per-day pulp ing plant to six tons per day to match it with the capacity of the paper machine. It was understood that the water and power required for operating a six-tons per day pulp plant would be available, but the disposal of effluents would create a problem, until a satisfactory unit for effluent disposal was set up.

4.86 In view of the vital need for conducting research on the technology for making pulp from different raw materials and realising the importance for production of papers, the Committee recommends as below:

- (i) Research on the suitability of unconventional raw materials like hard woods available in large quantities in the Indian forests and different constituents of bagasse, etc. should be carried out so as to improve the quality and yield of pulp and reduce/can be used in tropical countries to produce cheap printing paper as a substitute for Newsprint, made essentially from ground wood. Sugar Mills can be induced to use other fuels and spare bagasse for pulping, if the price paid for bagasse is somewhat higher than its fuel equivalent. Development of such ideas requires an integrated approach and the co-operation of different branches of the F.R.I. for solving pressing problems of the Paper industry is necessary.
- (ii) With regard to the main recommendation made by the Thirumala Rao Committee that the

its price. Such semi-chemical pulp

Cellulose and Paper Branch may be reconstituted into a separate full-fledged National Research Institute for undertaking research on all problems of paper industry, this committee whole-heartedly agrees that the time is now ripe for the setting up of a co-operative Research Institute for the Paper Industry. However, the Committee feels that for many reasons such an Institute may be established more profitably at a location, other than Dehra Dun. In the first place, a majority of the Paper Mills are located far away from Dehra Dun. Further, for the present, the major raw material for paper making is bamboo, and it seems that bagasse will be the next most important raw material in the immediate future. Both these raw materials are available together in plenty at other Centres but not at Dehra Dun. The large requirements of water and facilities for effluent disposal for a Paper Research Institute might also pose a serious problem at Dehra Dun. The question of establishing a co-operative Research Institute for the Paper industry at a suitable location, may, therefore, be examined by the Ministry/Ministries concerned in consultation with the industry.

- (iii) Notwithstanding the recommendation made at (ii) above the Committee feels that even after the establishment of a separate Institute for Paper; it will be necessary to have a Cellulose and Paper Section in the Forest Research Institute. The present Cellulose and Paper Branch, along with its small Paper Mill may, therefore, continue its work for determining the suitability of different material for the production of pulp and paper. In order to ensure that this plant is available for research and training at all times, the plant may be run regularly to produce some papers required by Government. If the machine is operated for the production of high priced special papers, with pulp obtained.

by imports and/or as market pulp from other Mills in India, then its operation is un-likely to result in a loss.

(iv) The proposal for increasing the capacity of the pulp plant may not be necessary if the Committee's recommendation for operating the paper machine is adopted.** It will, however, be necessary to provide adequate funds for staff, raw materials and maintenance spares for operating the Paper machine continuously for the production of special type of papers.

(v) The staff should be fully conversant with the operational features of Production Mills so that they can approach the problems of the industry in a realistic manner and can render useful assistance to them.

(M) Composite Wood Branch

4.87 This Branch has a wide range of activities. These include waste utilisation, plywood and veneers, wood working characteristics of timber, modified wood (compregated, impregnated, etc.), study of adhesives, plastics and fillers, manufacture of various forms of building-boards, particle boards, bamboo boards, uses and the physical properties of woods. Of these, the first three are considered to have the highest priority. In waste utilisation, boards and pieces of wood have been made from saw dust and other materials, but the processes have not been developed commercially. In the case of plywood, information has been published long ago on the peeling characteristics of a large number of woods. Current work is concentrated on the production of special kinds of plywood such as marine plywood, aircraft plywood and plywood for various special laminated purposes.

** The Committee had also the benefit of the views of Dr. Bhaskaran, Coordinating Officer, P.H. Engineering Research Unit, All India Institute of Hygiene and Public Health, Calcutta, which are given in Appendix IX.

4.88 In the field of adhesives, present work is concerned with the development of new glues from indigenous raw materials though the usefulness of some of this work is doubtful. Work is also going on with the object of finding suitable fillers and extenders for adhesives so as to reduce the cost of the glue.

Many new projects and processes have been devised. Patents have been taken out for several of these and in some cases allotted to firms but they have not resulted in industrial production. Several of the processes are clearly never likely to be economic and care should be taken that time is not wasted on unprofitable items of research.

4.89 In the review of the 1956 Expert Committee it was noted that a book on Composite Wood had been prepared and awaited publication. It has still not been published.

4.90 Woodworking research was actively started from October 1962 under "PL 480 Scheme". The turning, planing and boring characteristics of a few species of timber have been studied. The full range of standard wood-working tests has not, however, been carried out owing to lack of necessary equipment. These woodworking tests should be included in the comprehensive testing of timber as discussed in the next paragraph.

COMPREHENSIVE TESTING OF TIMBER

4.91 In other Forest Products Research Institutes, timber received for testing is usually tested comprehensively so as to obtain correlated data for mechanical properties, seasoning properties, durability and preservative properties, woodworking properties, veneering properties, pulping properties etc. Anatomical characteristics are also often included. It was noted that this was not being done at Dehra Dun and the desirability of organising such comprehensive testing of timber consignments should seriously be considered. This will involve co-operation between all the Branches concerned. The results should be collated and published for each species. Comprehensive testing of this nature will become especially important when comparing the properties of plantation growth and natural forest timber. The organisation of supplies of timber for testing will have to take into account these comprehensive testing requirements.

4.92 The following suggestions are made for future work:

- (i) The desirability for comprehensive testing of timber as is being done in other Forest Products Research Institutes should be seriously considered.
- (ii) In order to popularise the products of this Branch and to get them more widely known, there should be a show room where visitors can see the products.
- (iii) Steps should be taken to get the book on 'Composite Wood' published expeditiously.
- (iv) Priorities should be allocated to those subjects that are of primary economic importance to forest utilisation and forest industry, and these priorities should be strictly observed. Investigations should be concentrated on such subjects and time should not be spent on work that is clearly unlikely to be of economic importance.

(N) Wood Preservation:

4.93 This Branch has been transferred to the Biology Division for some administrative reasons. However, its work is concerned mainly with forest products and industry. Its head is a Chemist and the application of its findings is mainly industrial. The work is being directed by the head of the Branch. A notable and interesting project is on marine borers in several parts of India, bringing in cooperation of Universities and other authorities. The programme of the Branch as a whole is realistic, though rather too large for the available staff. A number of publications has been issued, many of which concern marine borers. The Officers of this Branch contribute useful articles in conjunction with those of the Seasoning Branch in the "Journal of Timber Dryers and Preservers Association of India". The Journal is published by the Wood Preservation Branch and serves as an excellent medium for keeping the industry fully informed of its work and for publicising the results. It is a measure of the

usefulness of this Branch that whereas in 1944 there were only 10 wood preservation installations in India, there are now 110.

4.94 The Committee noticed that there existed a dispute whether testing for toxicity against fungi should be done in the Wood Preservation Branch or Forest Pathology Branch and feels that these tests should be done by a competent Mycologist with all the facilities for culturing the fungi and conducting the tests under sterile conditions. The work, therefore, falls within the field of the Pathology Branch.

4.95. The Committee recommends that this Branch should be immediately transferred back to the Forest Products division to which it rightly belongs.

(o) Wood Seasoning Branch

4.96 Wood Seasoning and Wood Preservation are together the two important branches concerned with the utilization of timber, particularly for structural purposes. The two Branches combine in publishing the Timber Dryers and Preservers Association Journal which keeps the timber trade abreast of current developments in this field. The programme of the Wood Seasoning Branch is fairly stereotyped, and currently contains some 24 items many of which are of a routine nature. The time of the staff is taken up to a great extent in answering enquiries mainly of a practical nature. Which indicates the interest of the timber trade in seasoning. Yet, it is clear that the need for proper seasoning has not made any appreciable impact on the timber using agencies in the country. Relatively few seasoning kilns have been put up, the coverage of kiln capacity of the country is estimated at only 5% of what it should be.

4.97 The staff of this Branch is sadly depleted. The post of the head of the Branch (S.R.O. Selection Grade) has been vacant since last February and an R.O. has been holding current charge. The other Research Officer's post has been lying vacant since October, 1962. There is thus only one officer out of three in position, a situation that needs early rectification.

4.98 In addition to the approved programme, the following two items were mentioned under the fourth Five Year Plan:

- (i) "To develop a technique for the successful seasoning of refractory hardwood and to study the cause of abnormal seasoning behaviour of certain timbers."

This subject has been the main work of the seasoning section since the Institute was first established. The Committee felt that the work needs intensification and that with the present staff little progress can be made. Much of the whole project needs a critical analysis to ensure that full use is made of past results and that repetition of work is avoided.

- (ii) "Survey of Timber Industries in India".

The Committee could not find adequate reason why this item should have been entrusted to the seasoning Branch. It would seem to be more suitable for the "Utilisation Officer".
(See paragraph 4.109).

4.99 The Committee also noticed that in the item on Kiln Seasoning, the list of species tested included many that were not and could never be commercial timber (e.g. Mellotus philippinensis, Oroxylum indicum etc.) or timbers such as Sal, Amelina arborea, Lannea grandis, Dipterocarpus sp. (Gurjan) that had been tested for many years. The Committee, therefore, feels that some rationality needs to be brought into selection of species. The Seasoning Branch was also found undertaking investigations into the suitability of timbers for various industrial purposes, pencil slate, bobbins and shuttles, bent-wood furniture, shoe lasts, etc.

4.100 The Committee would suggest that -

- (i) the post of head of the Branch which has been lying vacant since considerable time should be filled immediately.

∟ information has already been obtained. But

- (ii) there should be adequate staff to carry out the programme of this branch with drive and imagination and to get the timber industry to take more interest in the proper seasoning of timber;
- (iii) there should be more personal contacts between the Officer-in-Charge, Wood Seasoning and the timber industry.
- (iv) the work relating to "Survey of Timber Industries in India", therefore, should not be the responsibility of this Branch but that of the "Forest Utilisation Officer in the Publicity and Liaison Branch", and
- (v) steps should be taken to ensure that the results of research in this field reach the people who are in need of them.

(P) Timber Engineering

4.101 This Branch deals with research into timber utilisation development on the structural side. The main point of all the design and structural works of the Branch is the economic use of short lengths of timber and of mixed secondary species of small dimensions classified according to their strength properties into groups suitable for different purposes. This is expected to facilitate the more complete utilisation of timbers from mixed forests, and of low quality. A number of sample structures has been erected in the country in which use has been made of short-length small-dimensioned, timber of secondary species.

4.102 The Committee observed that the following problems were at present engaging the attention of this branch:-

- (i) Formulating the research data and demonstrative observations;
- (ii) Scope of timber, concrete composite Construction for special structures in economising the structural cost of buildings;

- (iii) Constructional methods termite prevention;
- (iv) Utilizing secondary species of timber of short-length, small-dimension sizes is designs of nail-joined timber posts for electric transmission posts, transmission towers, telephone posts, etc.
- (v) Standardising the designs by way of blue prints prepared for use in structural roof frames.
- (vi) Investigating the timber columns in different species for various purposes.

4.103 This Branch runs various training course in Timber Engineering and Timber Technology in collaboration with the National Building Organisation for the benefit of the Engineers Architects, Builders and Industrialists. A short course in timber engineering is also run exclusively for State Forest Officers nominated by different States. No less than 65 courses are reported to have been run between 1959 and 1964.

4.104 The work of this Branch under the direction of the present officer-in-Charge has put timber on the map as a structural material and has been effectively publicised. The programme of this Branch is being well directed by the Committee of Research in Timber Engineering.

4.105 The following suggestions are made for further improvement of the work of this Branch:-

- (i) 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.
- (ii) In order to get the designs of the timber engineering branch more widely used, the Government departments responsible for buildings, viz., the C.P.W.D. and the

State P.W.D.s and, of course, the Forest Departments should adopt the techniques and designs for the use of secondary timbers to the maximum possible extent.

- (iii) More staff required for extension work should be provided. The proposal submitted by the Officer-in-Charge for increased staff for research, testing, training and tracing work should be looked into in detail. Judged by the results produced to-date, such staff will be fully and profitably utilised.
- (iv) Where private parties are charged with the cost of extension work only the actual travelling and subsistence expenses of the staff should be charged. If heavy over-head charges are added, private parties will tend to be reluctant to ask for advice which would prevent timber structures from being publicized adequately.
- (v) Necessary funds for adequate travelling by the staff of the Branch should be provided.
- (vi) The last Expert Committee had recommended the procurement of special equipment for testing the strength of structures for which facilities did not exist in the Timber Mechanical Branch and had also mentioned in its Report that such testing equipment was being installed. But no such machines have been installed so far. As these are essential items, the equipment should be procured and installed at the earliest for which foreign exchange, if necessary, should be released by Government.
- (vii) The research staff of the Timber Engineering Branch curiously enough, get different scales of pay from those working in other research branches of the Institute on the ground that they are not doing research. This differentiation between branches is untenable and the disparity between the pay of the staff of the Branch and that of

other Branches in the Institute should be removed, as it is a source of serious discontent.

(Q) Timber Mechanics

4.106 This Branch is well equipped to carry out almost any kind of testing except fatigue testing. The Committee, however, noticed that much of its work consisted of routine testing to determine the strength properties of Indian timber. There is, however, much to be desired in the statistical sense. Samples are received from the forest departments, selected by them in some unknown manner. There is no proper sampling of material at source. Testing is still done on the 2" square specimen. Most laboratories have gone over to 2 c.m. square specimens which make far better sampling of within-tree and between-tree variance possible. Perfectly good correlation can be obtained between the results from the smaller and the larger specimens so that comparability of data between the two methods is assured.

A vast mass of testing data has accumulated over the years and all computations are done by hand in the branch's own computing section consisting of a head computer and seven computers. The results are expressed as means with standard deviations. (The more meaningful use of lower confidence limits does not seem to be adopted). It should be possible to extract much more useful information from this data, if it were scrutinised by a competent statistician with the help of a digital computer.

4.107 Collaboration of this Branch with the State Forestry Departments was observed to be practically non-existent. There is also a notable lack of collaboration with other branches of the Institute particularly Timber Engineering. Little or no work is being done on the important question of grading. Modern developments in "stress-grading" with the use of special stress-grading machines need be looked into. The Committee, however, observed that while the Branch was doing some good work and that the programme was realistic and well-oriented, the out-turn of work in relation to the staff employed was small.

4.108
tions:-

The Committee has the following sugges-

- (i) The data collected in this Branch should be scrutinised by a competent statistician and then the digital computer is installed, most of the data from the Branch should be dealt with by the Statistical Branch. on the computers and most, if not all, of the computing strength of the Branch should be transferred to the Central Statistical Branch. The old data should be put on the computer tape so that it always becomes quickly available for any future purpose.
- (ii) More economical use of timber should be guaranteed if the Institute could acquire or develop a satisfactory stress-grading machine (such machines have been made in U.S.A., Australia and the U.K.) by getting it manufactured in India and supplied to timber firm.
- (iii) The Officer-in-charge of this Branch should contact state Forestry Departments to discuss their needs for timber testing and when supplies of materials are being arranged, he should ensure that these are being collected according to proper sampling procedures etc. The material should be obtained with comprehensive testing in view (see para 4.91).
- (iv) A machine for fatigue testing should be installed in the Branch.

(R) Forest Utilisation:

4.109 A Forest Utilisation Officer has recently been appointed and attached to the Branch of Publicity and Liaison. The Committee, however feels that the terms of reference for appointment

of the Forest Utilisation Officer should be carefully scrutinized and this officer should be placed under the Deputy Director of Forest Products and not under the Publicity and Liaison Officer. It has already been stated in the review of Seasoning Branch that the proposal to conduct a survey of industries by that Branch would be more appropriately done by the Forest Utilization Officer.

(S) Library and Documentation

4.110 The last Expert Committee commented on the inadequate space for the library and the need for a properly designed new library building. This recommendation had not yet been implemented, with the result that the situation has gone from bad to worse, and with the disorganisation caused thereby the library is now almost unusable. Periodicals are heaped up on the tables, on the floor and underneath the tables. It is greatly to the credit of the Librarian that he is still able to catalogue and keep track of his decessions. The Committee, therefore, strongly urges that a new library building of a really functional nature (the original library was anything but functional) be put up without delay. It should be big enough to accommodate all the surplus books in the branch libraries and to allow for 25 to 60 years expansion. It must have extensive 'stack rooms' for reference literature.

4.111 An institute of the size and importance of the F.R.I. and Colleges, which combines research and educational activities, must have a comprehensive and really efficiently run library. It must be in the charge of a well trained Librarian having knowledge of modern bibliographical and documentation techniques. It was observed that there was no indexing of articles in periodicals. One of the best aids to forestry documentation is the "Centralised Title Service", issued by the Commonwealth Forestry Bureau, in the form of cards, classified by the O.D. C. (the system now universally adopted and recently introduced at the F.R.I.). The Committee was surprised to find that only one set of these cards had been taken, but they too had

not been used. The cards were merely stored away in some drawers. The Institute should take several sets of these cards and, while rejecting those of no interest should file the others under the article or publication is in the library and if not, where it can be obtained.

4.112 The Committee has the following other suggestions for improving the library:

- (i) The library must have assured continuity of availability of foreign exchange for its books and publications. Series of periodicals must not be broken as has happened in recent years; and the gaps in the series caused by sudden cutting off of funds must be filled. Exchange must be provided for the purpose of the C.T.S. for as many copies as necessary.
- (ii) While the library must not be starved of money, careful scrutiny is necessary to see that periodicals that are rarely referred to are not unnecessarily taken. The Centralised Title Service can provide reference to articles in such periodicals that may be of interest and photo copies can be obtained.
- (iii) The Librarian and a selected member of the Library staff, should be sent to Oxford for training in forestry librarianship at the Commonwealth Forestry Institute. Later, when the new library has been built and starts functioning, it may be worthwhile inviting the Librarian of the Commonwealth Forestry Institute to come to India for some months to assist in organizing the library on the right lines.

∟ classifications given, indicating also whether the

Documentation

4.113 The Committee noticed that the Central Library was at present doing no documentation. This is being done for the Institute in a partial manner in the Silvicultural Branch. It is clearly the function of a central library to maintain complete, classified card-indices of all published matter of interest to the Institute and Colleges, whether it is in the central Library or in Branch Libraries. The Branch libraries should also have complete information of what is available in the Central Library in their respective fields.

4.114 The Silvicultural Branch had traditionally been a very well documented branch in the Institute. It was responsible first for Troup's classified information files, which were the basis for Troup's "Silviculture of Indian Trees", then for their wide extension under Howard's decimal system for the classification of forestry information and lastly for further extending the scope of the subjects covered under the O.D.C. It still maintains "Ledger files" under this system for general and specific heads and collects information in all forestry subjects and on utilization subjects in so far as they are applicable to forestry. The boundaries of its subjects overlap and its comprehensive coverage of the growing side of forestry has been spoiled recently by the placing of genetics and physiology in the Botanical Division, so that the periodicals on these subjects which used to come to the Silviculture Branch and which were included in their documentation are now not in the Branch. Similarly some information on Minor Forest Products is documented in the Silviculture Branch but not all, and the "Plant introduction" literature has also been sent to the Botanist and not to the Silviculturist. A uniform practice should be adopted in this matter.

4.115 The documentation done by the Silvicultural Branch is used by the whole institute. Classified lists of references to all material noted by the Branch are issued monthly to all branches including the Central Library, to all Chief Conservators

and State Silviculturists, to the Ceylon Forestry Department and the Commonwealth Forestry Institute, Oxford, and to a number of allied institutions like Central Arid Zone Research Station, Jodhpur, Indian Agricultural Research Institute, Delhi, etc. From time to time annotated bibliographies are issued on particular subjects - e.g. one was recently issued on bamboo.

4.116 The value of all this work is immense and is appreciated by the Branches of the Institute and by State Forestry Departments. The Committee, however, noticed that the work was being done under exceedingly cramped conditions which did not permit efficient working. Moreover, as the Documentation Officer is not a trained Forest Officer he has to rely on the advice of the Silviculturist.

4.117 The Committee cannot help recording that properly organised documentation cannot be introduced in the Central Library until a new library building is constructed. Yet, the organisation should be set up as soon as possible (it could function in one of the museum galleries or in any available space) and should be directed by the Central Silviculturists to start with, though its scope must be comprehensive. There is a large volume of arrears to be worked off, and the aim should be to get the system working smoothly by the time the new Central Library building is put up. The Committee would suggest that the staff of the library should be as follows:

- 1 Central Librarian plus present staff
- 1 Chief Documentation Officer (S.R.O.)
with Forestry Training.
- 1 Assistant Documentation Officer (R.O.
I or II)
- 2 Research Assistants
- 2 Library Clerks
- 2 or 3 Typists

4.118 The Committee noted that at present officers of the Institute remain ignorant of the work done and material published in foreign languages other than English. To overcome this deficiency, it is essential that translation facilities be provided in German, French,

Spanish, Russian and the Scandinavian languages. Really good linguists should be selected and given forestry training so that they can understand the technical terms. A regular translation service may be provided by them. At present there is a tremendous amount of typing out of material that could be photo-copied. Adequate photocopying services should be provided.

4.119 The following proposals are made for improving the documentation source:

- (i) In order that documentation is complete and unbiased (it is at present biased towards silviculture), the function of complete classification of information under the O.D.C. should be undertaken by trained documentation officers with forestry and forest products knowledge as a Central Library function. The function will comprise:
 - (a) Complete ^{card} indexing of all articles and other published literature under the O.D.C. by multiple cross-referenced subject cards, author cards, and geographical cards (wherever applicable).
 - (b) Furnishing copies of all cards to the appropriate branches for the maintenance of branch documentation indices. (No classified information files will, however, be kept in the Central Library)
 - (c) Making arrangements for frequent circulation of information extracted from publications to all State Forestry Departments, State Silviculturists, members of the staff of the Central Institute and Branch Stations and forestry industries on matters of interest to them.

(ii) The Central Library will obtain most of its information from the Centralised Title Service

and should take sufficient copies of this to meet the requirements and those of the branches. This will pay for itself by reducing card copying to a minimum.

- (iii) The Central Library should take over the responsibility for issuing the classified lists of references at present sent out by the Silviculturist to branches, State C.C.Fs. and State Silviculturist and other institutions.
- (iv) Branches, or in some cases groups of sections and branches, (e.g. Silviculture, Genetics, Physiology, Systematic Botany) will keep such classified information files (Ledger files) as are considered necessary in addition to the card indices of their subjects received via Central Library and will make full use of Forestry Abstracts, separates, leaflets, etc. for supplementating that information.
- (v) Bibliographies on specific subjects may be prepared by Central Library documentation staff in consultation with the Branch officers concerned.
- (vi) If any Branch has access to publications or information that has not come to the Central Library, that branch should supply the necessary references to the Central Library.
- (vii) Adequate documentation of literature in a subject as large as forestry is a difficult and exacting task and will need well qualified and trained staff. The Committee, therefore, recommends that such staff be built up. In addition to the Librarian, selected forest officers should be sent abroad for training for three months or so in documentation work. A period of training in the Silvicultural branch of the F.R.I. should also be valuable. It may be necessary to appoint a Forest Officer on deputation to help in documentation work since the present staff are not trained foresters and have frequently to refer matters to the Silviculturist.

The New Library Building

4.120 The Committee noted that the new library building proposed by the Champion Committee seven years ago had not yet been put up. The work of the Institute has clearly suffered as a result.

4.121 The Committee examined the plans for the new library building and found that adequate shelf space had not been provided. When all the surplus books from the Branch Libraries are accommodated, there would, on the present plans be very little space left for expansion. The Committee, therefore, recommends that the shelf space be doubled. The "Stack-room" space for material that is rarely consulted and which should not clutter up the working shelves, is also inadequate and should be doubled.

4.122 The Committee also observed that the amount of space for reading was also quite inadequate. With about 600 students in the two Colleges and 150 research workers and instructors, reading space should be provided at least for 50 to 60 persons.

4.123 The Committee considers that the new library should be a separate new building with air-conditioning throughout, and that in order to economise, other Branches requiring air-conditioned accommodation. - viz. the Herbarium (see para 4.24 (vi) with its associated museum, laboratories etc., and the Statistical Branch with its digital computer - should be included. Space should also be provided for the photographic collection (see paras 4.24 (vi), 4.30(ii) and (iv) and 5 4). The Committee therefore, urgently recommended that a revised plan should be drawn up and the building put up as a matter of the highest priority.

CHAPTER V

Review OF THE WORK OF THE CENTRAL SERVICES

(A) Publicity and Liaison

5.1 The Publicity and Liaison Branch was constituted in 1953 and, according to the recommendations of the last Expert Committee, it was reinforced in 1956 by the addition of the Photo Section, Power Printing Press and Block Making Unit. Under the Third Five Year Plan, an Information Centre has been established with the appointment of a Forest Utilisation Officer. The Purpose of the Branch is to give wide publicity to the work of the Forest Research Institute and to disseminate the results of reasearch. The objectives of its work may be stated as follows:

- (a) to spread knowledge of those developments and research which are ready or nearly ready for application such as work which is approaching the pilot plant stage or is actually in use in some industries.
- (b) to indicate that successful application can bring returns and that difficulties in making changes in industrial processes can be overcome and
- (c) to give public recognition to individuals and companies who have been progressive in the promotion of utilixation of research.

This Branch is active in the dissemination of information by a wide range of techniques including publications, exhibitions films, colour slides, and film strips. The Branch arranges for the publication and distribution of the research results of the Institue in the form of Indian Forest Leaflets, Forest Bulletins, Forest Records, Munnuals and other Publications.

5.2 There does not seem to be a clear division between functions of the Publicity and Liaison section

and the Editorial Board which arranged its own printing and publication. It would be an advantage to concentrate all activities relating to printing and publication in one Branch, preferably in the Publicity and Liaison Branch. The Editorial Board can be left with compilation work.

5.3 The Committee was informed that there was need for issue of News letters and similar periodical publications by individual branches or groups of branches. The Pathology and Antomology Branch should issue newsletters to forestry departments on forest diseases and measures needed to control them. A similar newsletter from the Pulp and Paper Branch should be issued to industry. The Committee observed that the Preservation and Seasoning Section was already issuing a journal. More such Publicity is needed.

The Committee, however, feels that the Forest Utilisation Officer who had only recently been appointed should be placed under the Deputy Director of Forest Products and that his work should be carefully defined.

Photography.

5.4 The Committee feels that the photography services for the Publicity and Liaison Branch and the research branches are scarcely adequate. A camera is needed for, microphotography and a microprinter is also required. The Photography Section is not properly equipped for the making of cinema films for publicity, a cinecamera with the required type of lenses is badly needed. There is a valuable photography collection dating back to the early days of the Institute which is a continuous source of illustrations for book and publicity work. It is stored in a damp insect infested place where serious deterioration to the negatives is occurring. It is essential that the collection is properly stored in a dry place well before the monsoons start. It should be stored ultimately in an air conditioned building.

Printing

5.5 Printing of publications presents a serious problem. The Government Press is overloaded with work

and the Institute's publications usually get low priority. There is, for instance, a publication on Minor Forest Products that had reached first proof stage over four years ago, but has not been printed so far. The Committee was informed that this was not the only case. Such delays are undesirable, especially for publishing research results, which may become out of date by the time they appear in print.

5.6 The Institute needs access to printing facilities which will avoid such delays. If no other arrangement is found satisfactory, the desirability of setting up printing facilities within the Institute itself should be considered. The amount of material to be printed would be sufficient to justify the Institute having its own properly equipped printing press.

5.7 The Institute has a small hand-press but this cannot meet the full requirements of the Institute. The Chairman informed the Committee that the Works and Housing Ministry had plans for the establishment of several Government Printing Presses in the country for dealing with Government publications, which should relieve the situation somewhat. The Committee, therefore, recommends that if the Government Printing Presses cannot print the publications of Institute expeditiously, the Institute should be allowed to have them printed commercially. Publications which are of immediate interest to industry or for education, and all priced publications should be allowed to be printed by private presses.

(B) Editorial Board

5.8 This "Board" was set up in 1958 for printing or revising text books on Indian Forestry. The staff are mainly engaged in writing or revising text books and original compilations. The first two tasks allotted to them were:-

- (i) a revision of Troup's "Silviculture of Indian Trees", and
- (ii) Trotter's "Manual of Forest Utilization".

The Committee observed that in the first task considerable progress had been made. Working to the proforma that had been standardised for each species, the Committee was informed that 80% of the book had been revised. Troup's original 3 volumes book comprises 40 chapters running to 1195 pages. The new publication, it is understood, would be between four and five thousand pages, and would be issued in about 8 volumes. The parts that were not done were stated to be those which were to be revised or written by experts outside the Board in the particular species concerned. For example the genus Diptroearous (including Sal) is allotted to the Uttar Pradesh, Conifers also to U.P., Teak to South India (But now being done by the "Editor") Bamboos to Silviculturist, Dehra Dun, Mangroves to West Bengal and Eucalyptus sop now being done by the Editorial Board. Thirty new families had been added to Troup's list. As species like sal, teak, deodar, chir, firs, bamboos and Eucalyptus are by far the most important timber species for the country requiring lengthy elaborations, it appears that considerable work still remains to be done.

5.9 Trotter's "Manual of Indian Forest Utilisation" was stated to be nearly complete. Out of 40 chapters, about 35 chapters had been revised so far. Illustration had to be selected and blocks prepared. Introduction, Index and appendices had also to be compiled. It is, a large and detailed book, and has been revised entirely by the staff of the Editorial Board, as it was found impracticable for the work to be done by Branch Officers as originally intended.

The Editorial Board has also compiled other valuable works, including a Handbook of Forest Statistics 1957-58 and a Timber Trends Study (1962). Apart from the above, the Editorial Board was also called upon to help in some other compilations from time to time as the need arose, for instance, the Souvenir Publication of the Centenary of Indian Forestry with the title "One Hundred Years of Indian Forestry" (Two Volumes) Country Progress Reports of the Ministry for Commonwealth Forestry Conference and Asia Pacific Forestry Conference, etc.

5.10 The staff of the Board consists of an Editor, Assistant Editor, two Research Assistants and three typists. This is rather inadequate, and the work would go faster if more typing help is given.

5.11 Based on the observation on the working of the Editorial Board, the Committee recommends that -

- (i) The name of this Branch should be suitably changed. The word Editorial Board is a misnomer. "Publication Branch" might be a suitable designation.
- (ii) In the revisions of Troupe's and Trotters's books, which are on hand, the original language of those portions which are adjudged suitable for retention in the revised edition need not be changed but should be retained as such, subject of course to the factual changes that may be necessary in the light of fresh knowledge.
- (iii) The chapters of the compilations under (i) as and when finished by the Board should be submitted to the Experts for critical comment before issue.
- (iv) The staff of the Editorial Board have been classified non-scientists and, therefore get lower pay than the other research workers. This is an anomaly which should be corrected.
- (v) In order to deal with work more expeditiously, a modest increase in the staff is necessary.
- (vi) A Production Officer of the rank of a research Officer should be added to the Branch. He should go through the final manuscripts and follow them up to get them through the press quickly.
- (vii) The Board in continuing on a temporary basis but, in view of the valuable functions which it is performing, it should be made a permanent branch of the Institute.

(C) Museums.

5.12 The museums are housed in the main building in large halls allotted to the Herbarium, Silviculture (Forestry) Museum, Timber Museum, Minor Forest Products Museum, Zoology and Botany Museums and also in the two new Exhibition rooms used for Timber Engineering and Chemical products. The Committee observed that these museums, though reasonably well-looked after had not developed with the times. Most of the exhibits are the same as they were 30 years ago. Oils in bottles have become discoloured and labels have faded. The Committee also noted a tendency to duplicate things in different museums. This should be avoided, so that maximum use is made of the limited space available for displaying new and original things. If interest in the museums is to be maintained, they should be continually changing with new exhibits illustrating currently important developments.

5.13 What has been stated above applies also to the Gass Museum at Coimbatore. While this museum seems to be well-maintained, it is more a heterogenous collection of objects and animals than a museum illustrating particular themes.

(D) Accommodation

5.14 The Committee was informed that there was an acute shortage of office and residential accommodation, because, while the activities of the Institute have been expanding in recent years, office and residential accommodation has not increased correspondingly.

5.15 Regarding office accommodation, while the erection of a new air-conditioned building for the Library Herbarium, Systematic Botany and Statistical Branches will give some relief in the main building, the need for more accommodation in several other Branches requires examination. Adequate working space should be provided where necessary.

5.16 The situation regarding residential accommodation is more serious. The Difficulty of getting satisfactory accommodation and the high cost of the same in Dehra Dun was represented to the Committee as an important factor deterring good staff from coming to the Forest Research Institute and staying there. The rapid turn-over in

certain grades, particularly in the Scientific Assistants' grades was attributed partly to this cause. With so many new Government departments coming to Dehra Dun and the rapid increase in the population of the town. It is becoming difficult to obtain accommodation at the rents which the Institute staff can pay.

5.17 The Committee noted that prior to the Champion Report the principle that all staff should be housed on the estate had been accepted by the Government of India and that adequate plans for the construction of residential house for all grades of employees were included in the Second Five-Year Plan. The Champion Committee had, therefore, no recommendation to make on this subject as it understood that proper provision was being made. Such plans, however, have not been imolemented. The Committee, therefore, reaffirms the principle that the Institute should become entirely residential and that housing of a suitable standard should be provided on the campus for employees of all grades. The urgency of the situation is self-apparent. When the F.R.I. becomes an Institute of National Importance it will be particularly desirable that it becomes fully residential, but action to remedy the acute situation should not be deferred until then .

5.18 The Institute receives trainees in a number of Branches from the States, Universities and Industries and is likely to receive more research workers for limited periods. There is at present no adequate provision for their accommodation. The Committee repeats the recommendation of the Champion Report that suitable residential accommodation should be provided for them.

(E) Amenities

5.19 It is necessary to provide welfare facilities and adequate amenities for the various ranks of employees working at the Institute, many of whom at present reside outside the estate for lack of accommodation within the campus. A suitable building for the purpose is, however, badly needed. The Committee was satisfied to learn that a proper canteen had been functioning within the Institute where refreshments were available at reasonable rates. The grants -in- aid sanctioned by the Government for various Sports Clubs, both for officers and staff residing within and outside the Institute premises, were appreciated by the Committee as a step towards the welfare of the employees. The Committee attaches great importance to this matter

of welfare and amenity as an influence in maintaining a happy and contented staff, and urges that continuing attention be given to it.

(F) Maintenance of Buildings and the Campus.

5.20 The Committee observed that the existing arrangements for the maintenance of the buildings and premises of the Institute were unsatisfactory. Maintenance is in the hands of the Central Public Works Department who had not been able to find either enough time or money to look after the work efficiently. The buildings were badly looked after, roofs need repairs and at certain places leaks were observed in the bungalows. The Committee feels that, since the Institute itself has got qualified engineers and, as the Forestry Departments have sufficiently high standards of building and maintenance, the Institute could be expected to organise and carry out the work better according to its requirements. The Committee, therefore, recommends that maintenance of all buildings be transferred, together with the labour gangs from the central Public Works Department to the Institute.

5.21 With regard to the construction of new buildings within the Institute, the Committee believes that serious delays that are occurring at present could be avoided if this work were to be done by the F.R.I. itself and that in doing so modern methods of using timber in high-class buildings could be demonstrated. The Committee recommends, therefore, that this question of erection of new buildings by the Institute should receive serious consideration.

5.22 The Committee also noticed that the maintenance of the grounds of the estate had been somewhat neglected and there was great scope for improvement. There should be more planting of judiciously selected ornamental trees.

5.23 To summarise, the Committee, therefore, recommends that:-

- (i) adequate provision of office and working space should be made where required. The new air-conditioned Library Building should be erected as a first priority;

- (ii) as already agreed, the Institute should become fully residential;
- (iii) urgent steps should be taken to provide accommodation for the staff of all grades;
- (iv) continuing attention should be paid to the provision of desirable amenities for all grades of staff at the Institute;
- (v) maintenance of the buildings and premises in the New Forest Estate should be transferred from the C.P.W.D. to the Institute;
- (vi) the desirability of the new buildings being put up by the Institute instead of by the C.P.W.D. should be seriously considered; and
- (vii) more attention should be paid to the better maintenance of the grounds of the estate. A curator, working under the direction of the Botanist, should be appointed for this purpose and an adequate staff of males should be provided.

CHAPTER VI

REVIEW OF WORK AT THE REGIONAL RESEARCH CENTRE

(A) SOUTHERN RESEARCH CENTRE - Forest Research Laboratory Bangalore

6.1 On the recommendation of the last Expert Committee which was based on requests for establishment of Regional Research centres from the State Forest Departments, industrialists and Branch Officers of the Institute, a Regional Research Centre was set up in the South with one wing at Bangalore and the other at Coimbatore. The Committee had recommended that the Forest Research Laboratory established in 1938 by the Mysore State at Bangalore should be taken over from the Government of Mysore and developed as a Regional Station. The Committee also recommended that the Station should work in close liaison with the Indian Institute of Science and the Central Virus Research Laboratory at Poona. It was made clear by the Committee that the Regional Centres were not intended to duplicate the work done at Dehra Dun but by investigations on regional problems to supplement that work.

6.2 The Committee visited the Forest Research Laboratory at Bangalore. It saw the large new building costing over Rs.6 lakhs, which is nearly complete. It held discussions with the staff employed at the Laboratory and branches and took the evidence of - (i) the former Director of the Laboratory, who was also in charge of it before control was taken over by the Central Government (ii) the Chief Conservator of Forests, Mysore; and (iii) the present Officer-in-Charge, designated as 'Head of Utilisation Branch Forest Research Laboratory.'

6.3 The work of this Laboratory falls into two main categories, namely -

A Sandal Spike Disease work; and

B Forest Products work.

Sandal spike disease research is a matter of primary importance to Mysore, Madras and Kerala States. Work has been going on intermittently for

the past 35 years but the basic causes of the disease have not yet been discovered. The work that is being done at present consists of certain physiological and nutritional studies as well as irradiation of seeds with the object of producing polyploids in the hope that they may have some resistance to disease. Fourteen papers, mostly biochemical, have been published but none of these can be taken as helping towards a solution of the problem. The Committee feels that the work at this Laboratory is ineffective and is not directed towards solving the main problem of the cause of the disease and methods of controlling it.

6.4 As discussed elsewhere in this report (Chapter IV), the Committee feels that special arrangements will have to be made for dealing with spike disease if any progress is to be achieved.

6.5 The remainder of the programme of this station concerns forest products research, and is briefly indicated below:

(1) Timber Utilistion Section.

This Section is doing timber identification and study of the microscopical characters of timbers, determining the strength properties of Eucalyptus species and Santalum album sapwood. Why the strength of the latter, which is used in turnery, is needed is not understood. Nail holding capacity of some South Indian species is also to be studied. The Committee feels that the Forest Research Institute at Dehra Dun is far better equipped for such work and there is no need to duplicate it at this station.

(2) Wood Preservation Section.

This section has as its programme - (i) studies on the diffusion of fons in timber (a fundamental study better done at Dehra Dun or a University); and (ii) studies on durability of timbers of the Southern region. For the latter, there is a testing ground ("Graveyard") outside the laboratory (which Dehra Dun also has) but no other organized test grounds exist in different States. The Committee considers that in this case also it should have been possible to do this work perfectly well, if not more efficiently, at Dehra Dun. There is, therefore really no need for a wood preservation section at Bangalore.

(3) Chemistry of Minor Forest Products Section

The stated programme of this Section is:

- (i) evolving new methods of extraction of fatty oils from seeds of low oil content;
- (ii) studies of the essential oil of the Eucalyptus hybrid being planted in Mysore; and
- (iii) production of arrow-root from the tubers of Hitchemia caulina.

Of these items, the Committee feels that only No.(ii) is of immediate interest to the local forest departments. But this item could be better studied at Dehra Dun which is equipped not only for the first stage chemical work but also for semi-commercial scale distillation of essential oils.

6.6 On the whole the standard of work at this laboratory is not impressive. There is evidence of a lack of appreciation of the relative importance of the subjects chosen for investigation. Quite unimportant items have been considered to have great economic possibilities and very little work of practical usefulness is being done. Some of the work done duplicates that at Dehra Dun. There does not seem to be much of a personal contact with Forest Departments of the region and there is hardly any liaison with industry. It appeared to the Committee that this sub-centre has not fulfilled the purpose which was set before it.

Though the Committee is not very happy with the work of this centre, it feels that it has a useful role to perform in future. The Committee, therefore, strongly recommends that its programmes be re-oriented in the light of the local needs and its work be conducted under the guidance of the corresponding research or technical branches of the F.R.I. The Committee also recommends that an appropriate scientific committee may be set up for drawing up the programme of work of the centre.

(B) Southern Forest Research sub-Centre - Coimbatore

6.7 This Sub-Centre, like the one at Bangalore, was also started as a result of the recommendations of the Champion Committee. It was created in 1959 and now consists of the following four sections, all under the control of the Principal of the Southern Forest Rangers' College.

- (i) Silviculture and Soil Science;
- (ii) Botany;
- (iii) Mycology; and
- (iv) Entomology.

6.8 Five hostel blocks, formerly occupied by ranger students, have been converted into temporary laboratories. The Committee inspected these laboratories and had discussions with various members of the staff.

Silviculture and Soil Science:

6.9 It was noted that the Silviculture and Soil Science programme, for the most part, covered subjects that would normally be handled by the State Silviculturists. Some of the items were actually being duplicated. The question, therefore, arises whether there is any need for a silvicultural section at this sub-Centre, since it would merely complicate the relations between this section and the State Silviculturists. On the other hand, the Central Silviculturist at Dehra Dun is obviously unable to tour the Southern States sufficiently and to maintain adequate contacts with the work of the State Silviculturists. Although there may be no need to have a silvicultural section as such at Coimbatore Sub-Centre, it would be advantageous to have a regional liaison with the Central Silviculturist and the State Silviculturists. The regional Silviculturist will work on specific portions of the Central Silviculturist's programme concerning Southern States.

 Silviculturist at the Sub-Centre who should have

Entomology

6.10 This section started functioning in November, 1960. The Entomologist is doing a certain amount of systematic entomology and building up a collection of forest insects of the region. He also has a full programme of individual problems of local importance. The Committee endorses the establishment of such entomological out-stations, which are needed because it is impossible for the Dehra Dun staff to be everywhere to attend to outbreaks of pests when called upon to do so. One of the important functions, therefore, of such a section is to deal quickly with such outbreaks at the request of the State Forest Departments. At the present moment, the regional entomologists prescribed programme has priority over the above urgent problems. This is not desirable as requests for investigation of problems from State Forest Departments should have priority. One of the general items on his programme should be a survey of the post situation in the different States of the region. For this more field staff is needed. In the matter of studying the life history of some of important insects, there is scope for work being done in the Universities. At present no such collaboration exists.

6.11 The Regional Entomologist must, of course, be under the control of the Forest Entomologist at Dehra Dun. The present laboratory facilities are quite inadequate and need improvement. But above all it is necessary that the Entomologist be given greater opportunities of travel in the States of the region. At present his touring has been confined mainly to Madras and Kerala on account of shortage of funds. He should visit every State in the region at least once a year, quite apart from the touring required to meet the needs of survey work and calls from the States. It is also necessary that the Entomologist should have some more assistance since when he is out on tour, there is no one left at the regional laboratory which is often closed during the period of his tour.

Pathology

The section started functioning in April, 1960 with a Forest Pathologist as its head. He was, however, promoted as Senior Research Officer

and transferred to the Forest Research Institute at Dehra Dun. Since that date the Section has been in charge of a Systematic Botanist who has been doing his best to keep it going.

The Committee feels that this Section really should be an out-station of the Pathology Branch at Dehra Dun and should cover all types of diseases of trees. Here again activities are seriously restricted on account of inability to visit the more distant States. Disease surveys are necessary in economic plantations all over the region. But the present work is confined to Madras and the more accessible parts of Kerala and adjoining States. This Section is handicapped to some extent for want of equipment. Incubators provided some years ago are not functioning and there is no proper inclusion chamber or culture room. It is necessary that these laboratory facilities are provided.

Botany

6.12 The Botanist is building up a herbarium of local plants of forestry importance. He has taken over the collections of Fisher, Bourdillion and others which were in the Gass Museum and which contained some valuable type specimens. The desirability of housing such famous collections in the Forest Herbarium at the F.R.I., rather than in temporary quarters at Coimbatore, may be considered.

One of the important functions of the Botanist is identification of specimens for the State Forest Departments and for this a good local reference herbarium collection is necessary. A revised Forest Flora of Madras is reported to be in the press. This is a big work which has taken the author some five years to complete. But it was not known whether it is conventional lines, or whether modern taxonomic concepts have been introduced. The Committee feels that such a work needs to be scrutinised by a competent systematic Botanist before publication.

This is merely a revision of the old Forest Flora on the

The Botanist is working in isolation, since there has been no direction from the F.R.I. Dehra Dun wing to the disappearance of the Systematic Botany Branch there. The Committee would suggest that as and when a strong Systematic Botany Branch is established at Dehra Dun, the Coimbatore Botany Section should be regarded as its out-station for doing local work. The collections made by the Botanist at Coimbatore should be of modern standards of excellence and should comprise flowers, fruit, bark and timber specimens, etc. from the same individual trees and shrubs. Duplicates of all specimens collected should be sent to the F.R.I. Dehra Dun.

Like the Entomologist, the activities of the Forest Botanist too have been restricted on account of lack of funds for travelling. He also needs more field assistance for collection and preparation of specimens. The Committee hopes that when the Central Botanist is appointed, allocation of work in the matter of monographing genera and families of forest importance will be made.

6.13 While complimenting the staff on the keenness and interest they have shown in the work carried on under the most difficult circumstances, the Committee recommends the following steps:-

- (i) Insofar as the Silvicultural Section at Coimbatore is either duplicating work that is being done by the State Silviculturists in the region or is doing work that is more normally done by them, such work should gradually be terminated and transferred to the State Silviculturists who are better organised to carry it out.
- (ii) The Regional Silviculturist should act mainly as a liaison officer between the Central Silviculturist at Dehra Dun and the State Silviculturists as well as a co-ordinating officer between the State Silviculturists in the region. His liaison functions with Dehra Dun should include such matters as tree-breeding (Genetics Branch) and any other forestry research activities that will normally be executed in the field by the State Silviculturists, and he must keep

Dehra Dun informed of the problems and activities of the State Silvicultural Research Branches.

- (iii) Only where the States in a region do not have efficient silvicultural research branches should the Regional Silviculturist actually organise and carry out research, but in order to do this he will have to have his own staff of subordinates and must work in the forests of the States largely relying on them for labour and services.
- (iv) The organisation terms of reference and duties of the Regional Silviculturists will have to be worked out for each region in relation to the existing State Silvicultural Research Organisation taking into account their efficiency and the scope of the work they are doing.
- (v) The Regional Silviculturists will be responsible for seeing that the programmes of the Central Silviculturist are carried out in so far as they relate to the regions. This will normally be done through the agency of the State Silviculturists.
- (vi) The Entomological Section should be considered as an out-station of the main Branch of Dehra Dun and the Regional Entomologist should, while carrying out his own programme, give priority to the urgent problems in the field (such as out-break of epidemics) posed by the States in the region. He should survey the pest situation throughout the region as a major item in his programme.
- (vii) The title of the "Mycology" section should be changed and it should be regarded as an out-station of the main Pathology Branch at Dehra Dun.
- (viii) The Regional Entomologist and Pathologist should be under the control of the Forest Entomologist and the Forest Pathologist respectively of Dehra Dun.

- (ix) The Botany Section should also be regarded as an out-station of the main Botany Branch of Dehra Dun under the Control of the Branch Officer.
- (x) Funds for travelling should be increased substantially in order to enable the Regional Research officers to tour all the States in the region adequately and to visit Dehra Dun at frequent intervals.
- (xi) Proper buildings laboratory facilities and equipment should be provided. The present temporary accommodation in the students' hostel is quite unsuitable.
- (xii) Residential accommodation should be provided for the staff.

(C) General proposals for Regional Centres

6.14 The establishment of Regional Research Centres, which had been asked for by State Forest Departments, industrialists and the Research Officers of the Forest Research Institute Dehra Dun was strongly supported by the previous Expert Committee. At that time nuclei already existed in the Southern region at Bangalore and Coimbatore. This Committee understands that the Government of India is actively considering the establishment of Regional Centres at Gauhati in Assam (East) and at Jabalpur in Madhya Pradesh (Central) for which a sum of Rs.50 lakhs had been allocated during the Third Five Year Plan. There is also a suggestion that a Regional Centre might be set up in the Andamans.

6.15 The Committee feels that the scope and functions of those Regional Centres need careful consideration. In as much as Forest Products Research can best be done at the F.R.I. Dehra Dun, the Committee recommends that at the new Regional Centres, the Research work should be confined only to silviculture and biology on the lines suggested for the Coimbatore Centre.

It is essential that these centres do not become miniature Forest Research Institute competing with the Central Institute at Dehra Dun. They must definitely be

sub-stations of the F.R.I., in functioning as feeders and extension points. The primary function of such regional research stations should be to deal with regional problems adequately and speedily. They should be adequately staffed for this purpose. Their work must be controlled in technical matters by the corresponding Branches of the Forest Research Institute.

Regional Research Centre for Andamans.

6.16 The Committee has considered the question of setting up a Regional Centre in the Andamans and feels that the time is not yet ripe for this. There should, however, be a Silvicultural Research Officer in the Andamans and possibly also a Utilisation Research Officer who could, under guidance from the Forest Research Institute, Dehra Dun, tackle the specific problems of the Andamans.

CHAPTER VII

RESEARCH PROGRAMMES AND UTILIZATION OF RESULTS

7.1 Considering the research programmes in general, the Committee is of the view that new items in them should arise in any of the following approved ways, with priorities allotted in the order given below:

- (i) by enquiries and requests from the States,
- (ii) from Conferances, e.g., the Silvicultural Conference, Utilisation Conference, etc.
- (iii) as a result of the visits to State Forest Departments or to the industries to see their problems;
- (iv) by discussions between research workers in different disciplines.
- (v) by ideas occurring to the research workers in the course of their work, and
- (vi) by instructions from higher authority.

7.2 The research programmes should be discussed and fixed at regular and frequent intervals, after making a close scrutiny of all the continuing items as well as the new ones. At the time of scrutiny, the priority of each item should be adjudged in the light of the direct practical contribution it can make to the objectives already decided, using economic criteria whenever possible. In considering the new items for inclusion in the programme there should always be a detailed project analysis defining the objectives precisely and analysing the potential value of the result to forestry or to forest industry. It is, of course, far easier to add items to a research programme than to eliminate them. While scrutinising the programmes periodically any items that have been going on for five years or more requires particular attention. If a low priority item seems superfluous, there should be no hesitation to cutting it out. From this Committee's reviews of the programmes of many branches, it is clear that such a scrutiny is overdue. The scrutiny should be done by the various sub-Committees of the Advisory Board of Research in consultation with the research workers concerned.

7.3 This Committee noticed a curious tendency amongst many research officers to regard a big programme containing many items on it as an indicator of the importance of their Branch or Section. On the contrary, the Committee feels that a large programme with many items beyond the scope of the research officer is a sign of poor control of work and failure to appreciate what is important and what is not. The most important criterion of the value of research work is the output of useful results. It is far better to have a few important items on which good progress is made than to have to have a large number of items that are beyond the power of research workers to cope with adequately.

7.4 Special care has to be exercised in taking up programmes of applied research on Forest Products, intended for commercialization. Here the possibility of commercial utilization of research results should invariably be given top consideration. The committee has been told that most of the patents (list is very long) evolved as a result of research at the Institute have not been made use of by any industry so far, which indicates that the research done did not fully take into account the practical and the economic aspect, of the proposition. The commercial exploitation of processes evolved at the Institute will become feasible only in the mode of selecting problems and the angle with which they are tackled are modified. Firstly, problems that have obviously no prospects of commercial utilisation should not receive priority. Secondly, proposal for pilot plants, should not be drawn up by the scientific staff in an isolated way without association of probable sponsors from the private or the public sector. There should also be a guarantee that the funds provided for pilot plant research are adequate to ensure a thorough techno-economic assessment of the process under study. Lack of these preliminary precautions had often resulted in a frantic search for sponsors for commercial exploitation after conclusion of experimental work, followed by frustration when the efforts are unsuccessful. Sometimes research workers themselves have chosen problems for investigation on a pilot plant scale without adequate assessment of availability of the raw material or specific services. Sometimes attempts to commercialize the research work have begun after the completion of so-called Pilot Plant work, and when these attempts did not succeed, the research workers complained of the apathy of the industrialists towards their work, or else they took cover behind the argument that more staff should have been employed for extension publicity and liaison work.

7.5 For instance, routine work on Pencil Slats continues even though two factories in the country are already making such slats on a commercial scale, and the use of pencils itself is likely to go down with the emergence of cheap ball-point pens. Similarly, research on cultivation of cane ignores the present position that polythene strip is rapidly replacing the use of cane for woven seats and backs of furniture. In yet another case, it was stated that the work/the know-how was sold to a private company a few years later. Although the company has not produced saw-dust Boards on a commercial scale till today, the Institute has not made any effort to ascertain the reasons for the same. Then again, the Committee came across a suggestion that provision be made for a Pilot Plant for the production of rayon grade pulp from bamboos, at the cost of Rs.200,000/-. While such a proposal might have had some merit when the rayon industry in the country was in its infancy, there is no justification for it now, when one mill for the production of rayon-grade pulp has already been established near Calicut in Kerala, and they have had some success with a process modified by their own investigation. Other rayon plants too have their own testing and research laboratories. The industry is finding it increasingly difficult to obtain adequate foreign exchange for importing dissolving grade pulp and this situation acts as an incentive to research for production of pulp. Thus, there is no need to embark on such research, unless it is sponsored financially by industry.

7.6 The Committee recommends that the Institute should embark upon major Pilot Plant research only when substantial portion of the expenditure is borne by either a private or a public sector industry, or a specific grant is made by a Central Ministry or a State Government.

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and that

CHAPTER VIII.

FORESTRY EDUCATION

General

8.1 Training of technical personnel of high quality and in adequate number is a basic need in any technical field. In the field of forestry in this country, education came twenty years ahead of research. After that, for nearly 60 years tradition has woven these two together into one fabric, which is the organisation of the F.R.I. and Colleges. In the last 10 years, expansion on training facilities at the F.R.I. & Colleges, has exceeded the expansion on research side. Today, there is hardly any forestry university or institution in the World with an annual intake of 100 students for the professional and 250 for the ranger's training in forestry which is the current rate of admission at the F.R.I. & Colleges. This fact should be kept in view while considering the steps needed for improving the training facilities at the various forest colleges.

8.2 Forestry education in this country has hitherto been the sole responsibility of Government. Since 93% of the forest land in the country is Government-owned employment opportunities for trained foresters are mainly in Government Forest Departments. But times are changing and the practice of limiting forestry education to those who are pre-selected for appointment under the Government needs to be reconsidered. The demand for providing for forestry training to the technologists employed by forest-based industries has been met by allotting four seats at the Indian Forest College to industry-sponsored candidates. Similar reservation of seats for industry-sponsored candidates will have to be made in the Rangers' Colleges. Besides providing for the requirement of industry, it is necessary to admit to the forest college a few young men who are available after training for specialised jobs in research and teaching. The Committee, therefore, recommends that in each forest college 10% of seats should be kept for industry-sponsored candidates and other non-Forest Department nominees. This percentage can be increased or decreased depending upon the response to this step.

Panel on Forestry Education

8.3 The Committee was glad to note that the Central Board of Forestry had in January 1965 already decided to set up a Panel on Forestry Education. There is no doubt that since the last world War so many dynamic changes have taken place, affecting the outlook on forestry, and Forestry Education can ill-afford to be oblivious of them. Although the F.R.I., and Colleges is, traditionally, a strong institution for forestry education, the detailed objective reviews from time to time regarding the scope of reform in teaching methods, syllabi, educational programmes, pattern of different courses etc. are not being carried out by any specially constituted body. The Panel will fulfil this vital need.

Research facilities for training staff

8.4 The Committee suggests that the members of the teaching staff of the Forestry Colleges should be encouraged to do research at the Research Institute, and to work for higher degrees. This will improve their professional knowledge and enliven their teaching. The First Expert Committee had, in fact, recommended arriving at a workable arrangement whereby the staff engaged on teaching are able to conduct research on problems in their own fields. This recommendation was not implemented. However, the Committee reiterates the recommendation and urges that it be implemented urgently.

Teaching by Research Staff

8.5 The Champion Committee had stressed in its report that research is benefited by participation of research worker in teaching as it widens big outlook and helps to ensure that his thinking is clear. The Committee noted with regret that many of the senior members of the research staff do not participate in teaching in the Indian Forest College which has been in many cases, delegated to juniors. This needs to be remedied, by devising appropriate administrative arrangements whereby the senior research staff can divide their time suitably between research, teaching and liaison with Forest Departments and Industry.

8.6 The Committee also recommends that when the Forest Research Institute gets the status of an Institute of National Importance, students of the Forest College who show

an interest in research should be given an opportunity to work for higher degrees in the Institute either immediately after graduation or after a period of field service. Forest Officers in service in the States should also be encouraged to come to the Institute to do research and work for higher degrees. In this way, a supply of research officers will be ensured for the State Forest Services, the Institute and for forest-based industries.

Syllabuses

8.7 There is no doubt that revision of the syllabuses should be the first concern of the Panel on Forestry Education. The revision should result in modernisation of the curricula consistent with the changing needs of the country, recent advances in research inventions and new techniques.

Text Books

8.8. Suitable text books on many forestry subjects are still not available in the country. Senior Officers who are expert in the subjects should be requested to write them on payment of suitable honoraria. This is much better than allotting the whole work to the editorial board as a part of its routine duty.

Foreign Languages

8.9 In an institution like the F.R.I. there should be some arrangement for teaching foreign language like Spanish, French, German and Russian and for translation of scientific works into those languages. Knowledge of one or more of these languages will be helpful to the investigators and teachers in understanding the publications on the recent advances in these languages. Secondly since there is a demand for trained forest officers and forest products technologists outside the country, particularly in the countries of Latin America and Africa where Spanish and French are used it will be useful to develop facilities for learning these languages at the Institute. The students of the Indian Forest College may also take advantage of the facilities. A small group of expert translators should be built up.

CHAPTER IX

STATUS OF THE INSTITUTE

9.1 This Institute is the only Institute in the Country dealing comprehensively with the education and training of men for the forest services and for research in the problems of forestry and forest products. It was established some 60 years ago and has a long history of fine achievements. But conditions have now changed and the need for qualified staff both in the colleges and the Institute has greatly increased. The committee; therefore, considers that, in order to attract the right kind of men and to encourage a high standard of teaching and research, some change is necessary in the constitution of the Institute.

9.2 Forest Officers receiving post-graduate training at the Forest College receive only a diploma at present, though the course is of as high a standard as in most European or foreign Universities granting degrees. While this may not be a handicap within India where the position is understood, it can be a serious handicap for those wishing to take higher degrees in foreign universities. It also affects the prospects of employment with international agencies, e.g. the F.A.O. These difficulties would be overcome if the Forest College was empowered to grant degrees at the conclusion of the Forest Officer's course.

9.3 This Institute provides opportunities for research on a wide range of subjects, and if it were able to offer research degrees, it would attract students for research work, not only from the Forest Colleges but also from the Biological, Physical, Chemical and Engineering faculties of the Universities. This influx of university men will have a stimulating effect on the work of the Institute. Instructors at the Colleges should also be encouraged to do research. This will enliven their teaching, keep them abreast of latest developments in their subjects, and give them opportunities of professional advancement.

9.4 The Committee believes that, if the status of the Forest Research Institute is raised so as to empower it to give degrees, better quality of staff will be attracted and staff already there is more likely to stay.

9.5 The question of affiliation of this Institute with a University has been considered by the Committee but was

rejected. The Committee feels that such a step will deprive the Institute of its national and international character, and will result in the Institute being regulated by all the rules and regulations of a University which will not be conducive to the quick and natural development of its specified activities. On the other hand, its conversion into an autonomous institution will achieve the above objectives and also solve many administrative problems. There would, however, have to be some changes in the methods of entry into the Colleges. The present system of pre-selection of all students before hand and of guaranteeing all of them jobs on passing out would not in that case be acceptable and free entry for anyone wishing to study forestry subject to limitations of total numbers to be taken will, have to be provided. One of the fears expressed by those at present engaged in teaching forestry is that, if the guarantee of a job at the time of passing out is not there, there are very few other outlets for trained foresters, as there is no private forestry sector in this country, and the demands by industry for men with this sort of training are limited. With this doubt about future employment they apprehend that the better men, who now apply for forestry training will not come forward, and that the standard of intake will go down. In this connection, the Committee cannot help mentioning that:-

- (i) The number of students can be so regulated that the output does not exceed the employment potential by more than a small number. Thus the best men will always get jobs, and this is as good as the present guarantee of employment.
- (ii) There can be a competitive entrance examination either at Dehra Dun or in the State together with an interview and, if necessary, a period of practical forestry work before coming to Dehra Dun which will weed out all unsuitable and unqualified candidates. Suitable men could then be given State grants for their training.
- (iii) Any candidates who do not succeed in entering the forestry service, or do not wish to do so, can specialise in their final year or do an extra year for a higher degree with the aim of either obtaining employment in research or in an appropriate forestry industry. The integrated nature of the F.R.I. and Colleges provides an admirable set-up for such specialised training.

9.6 The relationship between the F.R.I. and the State Forestry Departments must be maintained and strengthened. It has been suggested that if the F.R.I. were to cease to become a Government Department and were to develop into an autonomous body of University status, the control and direction of research work at the Institute to fulfil the function for which it was originally established, namely, to solve the forestry and utilization problems of the State Forest Departments would be lost, and the Institute might indulge in more and more academic work of little value to the States. This must not be allowed to happen, and adequate safeguard against it will be provided in the composition of the Governing Council on which it is proposed that the Inspector General of Forests and the Head (Director) of the F.R.I. will be ex-officio members, together with three Chief Conservators of Forests (on three-year tenures of office rotating among the States), and a prominent forest industrialist, an educationalist and a member with special experience of science and research.

9.7 As forestry research necessitates a basic forestry training as well as experience in the field arrangements for deputation of Forest Officers for research at the F.R.I. should remain as at present. There should be unified scales of pay for forest officers deputed to the Institute and the directly recruited research workers. The forest officers should enter the Institute on these scales at points equivalent to their State service pay plus deputation allowance. They should then have the option of continuing at the F.R.I. on the unified scales of pay (getting promotion to Conservator grade by the next-below rule when it becomes due) or becoming eligible for promotion to the senior posts.

9.8 The Committee has given considerable thought to whether the Institute should obtain university status by declaration under Section 3 of the University Grants Commission Act or be declared as an Institute of National Importance by Special Act of Parliament - and has come to the conclusion that, like the Indian Institutes of Technology, the Forest Research Institute should also be declared as an Institute of national importance. The Committee recommends that further action, attendant on such declaration such as

formulating the detailed constitution of such an Institute, determining the composition of various authorities like the Board of Governors, Senate, Council, etc. may be undertaken by a Committee specially appointed for the purpose.

9.9 The Committee further recommends that, when the Institute is converted into an Institute of national importance, and the suggestions made by the Committee for reorienting the work of the Institute are implemented, a suitable Screening Committee will have to be appointed to determine the suitability or otherwise of the present staff members. This Committee will examine the cases of all persons and decide, on the merits of each case, how and where one could be best utilised. There may be however, certain anomalies; and as it would be difficult to discharge those who are in permanent employment, they may have to be retained in employment until retirement, but this should be done in such a manner that they do not hold responsible posts for which better men are available. This is necessary in order not to further hamper the work of the Institute or in any way to act to its detriment.

CHAPTER - X

ADMINISTRATION - COMMENTS AND PROPOSALS

(A) Recent History

10.1 Before World War II the Forest Research Institute consisted of eleven branches. All the branches on the forestry and forest biology side were staffed by Forest Officers of the Indian Forest Service and the Provincial Forest Services deputed from the Provinces. The Head of the forest products side and the Minor Forest Products Officer were also Forest Officers. Other Branches on the forest products side were manned by engineers, chemists, etc. After the Second World War there was a sudden increase in forestry activities in the country. Suitable Forest Officers were not available in adequate numbers to man research posts in the Institute and large numbers of scientists were directly recruited from the Universities and elsewhere. In 1947-48 many of the Sections became independent Branches and two new Branches viz. the Publicity and Liaison Branch and the Statistical Branch were formed. In 1950 there was further reorganisation when some Branches were split up to make a total of fifteen. The posts of Registrar and of Director of Forestry education were also created at this time. In 1952-53, a separate Timber Engineering Branch was created, thus raising the total number of Branches to sixteen. In 1957, on the recommendations of the Champion Committee, the Branches were grouped under eight Divisions, namely:

- (i) Mechanical Technology;
- (ii) Chemical Technology;
- (iii) Forest Botany;
- (iv) Forest Protection;
- (v) Seasoning and Preservation;
- (vi) Forest Education;
- (vii) Forestry Research;
- (viii) Central Services.

In addition, two Regional Research Centres were established, one at Bangalore in 1958-59 and the other at Coimbatore in 1959-60. In 1962-63 the Research Branches at Dehra Dun were regrouped into four

Directorates, viz.

- (i) Forestry Research;
- (ii) Biological Research;
- (iii) Forest Products Research;
- (iv) Forest Education.

10.2 The Institute, together with the Southern Forest Ranger's College and the Regional Research Centres at Coimbatore and Bangalore form a unitary organisation providing higher forestry education and the entire range of research on both the production and utilisation sides of forestry. The organisation is at present a Central Government Institution working under the Ministry of Food and Agriculture (Department of Agriculture). The Institute is concerned with applied research with a view to improving management of State forests and supply of raw materials to forest-based industries. A considerable amount of useful work is being done, and the Institute has served the country well. Nevertheless, the work of the Institute has been the subject of much criticism from some quarters. The main points of criticism are:

- (i) Research work has not kept pace with the current needs and problems of the Forestry Departments, especially from the points of view of forestry economy.
- (ii) On the forest products side, there is lack of understanding of the needs of industry and much of the work is not directed towards solving the more urgent problems.
- (iii) There are many items on the research programme that could never have any useful result either for forest managements or for industry.
- (iv) While the number of papers published is large, many of them have little scientific merit or practical usefulness.
- (v) Enquiries for information are often not answered at all, or are sometimes answered so perfunctorily that the reply does not help the enquirer.

(vi) The research officers work in isolation and do not maintain sufficient contacts with forest officers and men in industry; their visits to forests or factories are rare.

(vii) In general, the research work is out of date and not geared to the problems of modern times.

10.3 The Committee feels that there is some substance in these criticisms, and it is necessary to take action to remove the adverse factors and to establish a framework in which the Institute will be able to attract men of high calibre and experience so that the work will gain impetus and produce results useful to the State Forest Departments and to industry. The Committee considered a large number of suggestions submitted to it by the persons examined and also took into account various administrative requirements.

10.4 During its deliberations the Committee has come across a suggestion that the situation might improve if the Forest Research Institute is split into two or more Institutes. Branches dealing with Forestry subjects should be amalgamated with the Forest Colleges and the other branches dealing with forest products should be constituted into one or more research institutes. The same source has also suggested that, with the formation of a Cooperative Research Laboratory for the plywood industry at Bangalore, and the probable creation of a similar research institute for the paper industry at some suitable centre, there is no need for continuation of these two branches at the F.R.I. In the Committee's views these suggestions ignore the fact that research work on the economic utilisation of forest products cannot be pursued effectively without the fullest cooperation and association of research workers in forestry subjects, as well as of the State Forest Departments. The gulf that has arisen between the Forest Officers and scientists at the F.R.I. itself shows that such close cooperation will be next to impossible if independent institutes for research in forestry and forest products are set up. The Forest Research Institute at Dehra Dun is one of the best equipped integrated research institutes in the world for studying all aspects of forestry, its economics and utilisation of forest products. A reorganisation of the Institute

to ensure removal of psychological and other difficulties that have arisen rather than to split up the present set up into a number of independent institutes, is a more appropriate solution of the problem.

Yet another suggestion was that since a major function of the F.R.I. is training of Forest Officers for State Governments, all research posts should be held by Forest Officers alone. This view seems to overlook the fact that today specialised knowledge in the biological, physical and chemical sciences is essential for scientific forest management and utilisation of forest products. While it is agreed that all those who undertake research at the F.R.I. and Colleges must have adequate knowledge of practical forestry, the aim should be to spread forestry education to a larger group than at present, and not confine it only to nominees of State Government. Only in this way will it be possible to build, in course of time, a reservoir of forestry scientists, on which State Governments, research institutes like the F.R.I. and even the international organisations can draw.

The Committee has recommended that the Institute be converted into an Institute of National Importance. In addition, there are a number of administrative matters which need attention.

10.5 These are summarised below:

- (a) Problems caused by the influx of directly recruited scientists on terms and conditions that are different from those of the Forest Officers on the staff who are deputed from the State Forest Services.
- (b) Lack of knowledge and experience of forestry and forest industries by the directly-recruited scientists resulting in their being out of touch with the realities of the problems facing the Forest Departments and forest industries.

- (c) Restriction of recruitment in certain Branches, notably the Biological and Forest Products Branches to directly-recruited scientists and the virtual exclusion of Forest Officers from them.
- (d) Short-term deputation of Forest Officers to the Institute.
- (e) Rigidity in the staff complement of Branches.
- (f) Promotion on the basis of seniority-cum-merit rather than on the basis of suitability for the post. This combined with (e) results in serious misfits.
- (g) The existence of conditions which make it difficult to retain staff in the Research Assistant grades.
- (h) An unsuitable structure of Directorates in which the Directors are unable either to direct effectively or to relieve the higher administration of its load.
- (i) Lack of delegation of authority both at the President's level and at lower levels.
- (j) The President's position, under the present organisation, in which he is so over-loaded with administrative detail that it is difficult for him to direct the work of the Institute properly.
- (k) Financial restrictions on travel, resulting in the staff of the Institute being unable to keep in close touch with the Forest Departments in the States on the one hand and with forest industries on the other.
- (l) Financial restrictions on foreign exchange for essential items without which the Institute cannot function.

10.6 The directly recruited scientists have been appointed on salary scales which were on par with those of Scientific Officers in other Research Departments of Government but which were in most cases, lower than those of the Forest Officers who came to the Institute on deputation. This combined with the fact that the higher posts of the Institute were normally filled by Forest Officers, gave rise to considerable dissatisfaction among the scientists. At the same time the scientists did not seem to appreciate that, with their generalised training, they could obtain jobs in any Scientific Institute in which their particular discipline was represented whereas Forest Officers were confined to a forestry career.

10.7 In order to overcome these difficulties the Committee recommends that the scales of pay should be the same for the directly recruited scientists and for Forest Officers coming on deputation. Such unified scales of pay will, in any case, have to be introduced when the F.R.I. and Colleges attains the status of an Institute of National Importance; but their introduction should not await the change in the status of the Institute.

The possibility of arranging for deputation of scientists from the Central Scientific Services on terms similar to those given to Forest Officers deputed to the Institute should also be considered.

10.8 Another difficulty arises from the fact that the directly recruited scientists lack formal training in forestry and in forest utilisation, which results in their being out of touch with the problems facing Forest Departments and forest industries. No facilities have been provided for training them in forestry or giving them the opportunity to gain experience of forestry and forest problems by attaching them to Forest Departments. This lack of forestry knowledge by a large section of the staff of the F.R.I. is the basic reason for the work of the Institute having become too academic and its not being attuned to meeting the practical problems of the Forest Departments and Forest industries. This is also a reason why the highest post has normally been filled by a Forest Officer.

10.9 The Committee considers that the reservation of certain posts in the Institute for directly recruited scientists only is a retrograde step. It must be appreciated

that Forest Officers are themselves scientists. They have science degrees and have obtained forestry qualification which would carry post graduate status in universities abroad. In the past much excellent work has been done by Forest Officers in the Institute and this should be allowed to continue. There are Forest Officers in the State Forest Departments who have a bent for research, and whether they are Entomologists or Pathologists or Systematic Botanist or have a knowledge of any of the other disciplines that are required at the F.R.I. they should be encouraged, and not debarred as at present, from taking up posts at the Institute. The work of the Institute and its contribution to forestry knowledge has suffered from the exclusion of Forest Officers from certain Branches. The Committee recommends that all research posts, should be open to forest officers from States and to directly recruited scientists alike.

10.10 The Committee observed that one of the main causes of ineffectiveness in research was the short time that Forest Officers spent in the Institute when on deputation from the States. According to present arrangements, Forest Officers are only allowed to spend from three to five years at the Institute. This is not satisfactory. Research is mostly long-term work and a Research Officer is only beginning to be useful after four to five years. He is probably most effective from the sixth to the tenth years, though this will vary with individuals and circumstances. The Committee, therefore, recommends that these short-term deputations should be stopped. Instead a two-year probationary period of deputations should be followed by five years with the option of extensions for periods beyond five years. If a Research Worker or a teacher in the Colleges has real bent for the work, he should be able to make a career out of it and by in-post promotion on the "next below" rule, it should be ensured that his prospects are as good, at least up to the Conservator level, as they would have been if he had remained in his State.

Another difficulty is that of attracting the best men from the Forest Services for this Institute. The creation of an All-India Forest Service will improve this somewhat, but the main troubles are two-fold, namely:

- (a) The additional remuneration given to men coming to Dehra Dun is quite insufficient; and
- (b) the State Forest Services are often unwilling to spare their best men.

The inadequacy of the present allowances was commented on by the last Expert Committee which recommended an increase, but its recommendations have not been accepted. Before 1961, officers selected for deputation were allowed to exercise a choice between their grade pay from time to time plus the allowances which they were getting in the State plus deputation allowance equal to 20% of the pay (limited to Rs.300/-) and the Government of India's scale of pay to the post to which he was appointed in the Institute. In 1961, the Finance Ministry's general rules for deputation from State Services to Central Services were made applicable, which imposed a restriction on the total emoluments to be drawn by the officer on deputation so that they would not exceed the maximum stage of the Government of India's scale of pay of the post to which he is selected. Subsequent amendments to these rules, effected in 1954, stipulated a further restriction which denied the facility of drawing the minimum pay in the Government of India's scale of pay of the post to an officer whose actual emoluments in the State services were much lower. At present there is a very wide range of variation in the scales of pay in different States for posts of the same status and designation in the Forest Departments, which will remain till the new Indian Forest Service comes into existence. The revised rules of 1964 have made deputation to Central posts an unattractive proposition to forest officers of certain States which have either very low scales of pay (e.g. Kerala) or scales of pay comparable with, or higher than, those of the Government of India (e.g. Punjab and West Bengal). This has given rise to discontent as it amounts to giving unequal opportunities to the forest officers from different States to come to the Institute on deputation. Exceptions to the rule were allowed by the Government of India only in certain cases (e.g. Director of Forest Education, Director of Forestry Research and the Dean of the Indian Forest College). The Committee, after considering this issue at length, recommends that, when the new scales of pay as proposed vide Chart in the Appendix VII are approved and brought into force, there should be no restriction on drawing either the minimum of the Government of India scale of pay or on exceeding its

maximum in cases in which the later is favourable to the officers.

The State Forest Departments should be persuaded that it is in their long-term interest that good men with a flare for research or for teaching should be allowed to go to the Institute and, indeed, the Forest Research Institute needs the very best men available if it is to fulfil its functions properly.

10.11 The Committee was disturbed to note the very serious effects of the rigidity in the staff complements in the Branches and Sections, combined with the fact that promotions were being made mainly on seniority-cum-merit than on the basis of suitability for the post. This has resulted in some completely unacceptable situations. At present, when a man becomes due for promotion and there is no vacancy in the next higher grade in his own Section or Branch, he is transferred to another Section or even to another Branch regardless of whether he is skilled in the particular discipline of that Branch. There have been many instances of this type.

10.12 In order to avoid these difficulties the Committee, therefore, recommends that conditions must be created in which men can be promoted within their disciplines and the only way of doing this is to have flexibility in the number of posts of different grades in each Section. Some arrangement whereby the Institute has a number of supernumerary posts which can be allocated at various levels to different Branches will be necessary so to ensure smooth advancement within each discipline. Some anomalies will occur, e.g. a Branch may find all its Research Officers after a time as Senior Research Officers while another Branch may be headed only by a Senior Research Officer; but this far preferable to the present arrangement which is most demoralising to the staff. The Committee also considers that, in the interest of ensuring uninterrupted continuation of research schemes, the present practice of shifting a research worker from his field of specialization to another field merely to satisfy administrative requirements is undesirable. Ways and means should be provided, as suggested above, whereby reasonable

opportunities of promotion can be ensured within each discipline without dislodging men from the special fields for which they are best fitted. Adoption of a continuous scale of Rs.700-1600 for all the posts of S.S.Os. (Senior Scientific Officers as indicated in the Chart Appendix VII) will go a long way in removing these anomalies.

10.13 The Committee further noticed that it is extremely difficult to recruit suitable technical hands to man the Research Assistant's and Technicians grades. The turn-over in these posts is very rapid, and is seriously hindering the work of the Branches. In order to get over these difficulties, the Committee recommends that the scale of pay and emoluments of Research Assistants recruited to the Institute should be fixed in relation to the academic qualifications required for the post. Men of higher academic qualifications should normally not be appointed unless they can give some guarantee that they will stay in the post for a minimum period of two years. The Research Assistants will also remain longer at the F.R.I., if, after it becomes an Institute of National Importance, they are given the opportunity of working for higher degrees. Another possibility is that, in suitable disciplines, e.g. silviculture; minor forest products; botany; field collection etc., Forest Rangers might be taken on deputation to fill the posts of Research Assistants. The Committee recommends this step.

10.14 The grouping of Branches of the Forest Research Institute and the Colleges into four Directorates has several disadvantages. Firstly, by expanding the scope of each Directorate it became much more difficult to find a man who was able to direct effectively the full-range of subjects under him. Secondly, the Directors appointed to the Directorates were themselves Branch Officers and retained responsibility for their Branches. This was a full-time job in itself and as a result they had no time for directing the other Branches in their Directorates, even if they were capable of doing so. One of the purposes of this arrangement was to relieve the President of a great deal of minor administrative work. Actually the Committee noted that none of the Directors seemed to have any administrative powers and they were, therefore, unable to relieve the President.

Even minor matters had to be sent to, and approved by, the President. The Committee feels that this arrangement is unsatisfactory and recommends that the four Directorates should be abolished. In place of these, in order to relieve the President of a good deal of administrative work, it is recommended that three Vice-Presidents (or Deputy Directors, if the Head of the Institute is designated "Director"), should be appointed. (See para 10.19) below.

(B) The Appointment and Responsibilities of the Head of the Institute.

10.15 In its report the Champion Committee had recommended that the President as the Chief Administrative Officer of the Institute and Colleges should be a distinguished scientist, whether a professionally qualified forester or not, and should have the personal qualifications needed to make a good administrator with a distinguished record in forestry, forest research or in related sciences entitling him to the full confidence of the staff and of the State Forest Departments. Generally agreeing with these recommendations, the Committee would further like to stress that the head of the Institute should have an intimate working knowledge of the needs of the country in respect of Forest Management and of problem of utilisation especially for industry. This is necessary in order that he can ensure that the work of the Institute is being directed towards the most urgent problems of the highest economic importance and also so that he will have the full confidence of the State Forest Departments which the Institute is primarily designed to serve. Secondly he must be a good scientist, whether a forest officer or not, well versed in the scientific method and be able to distinguish good research from bad research, and to guide research officers and forestry educators, in their methodology, even though he may not be fully familiar with all the subjects they are working on. Thirdly, he must have the ability to control the staff and keep them happy. This matter of managing personal relations in an Institute of this kind, particularly when it is staffed by men from different sources, is of the greatest importance. Fourthly, he must be a strong administrator with sufficient independence of mind and drive so as to be able to cut through red-tape and to delegate responsibilities to others.

10.16 Regarding the responsibilities of the head of the Institute, the Committee observed that he has to obtain approval of the Ministry on matters/even minor administrative matters. This is done not through the Inspector General of Forests but through the Joint Secretary in the Ministry. Despite the setting up of the Court and the Executive Council, the administrative control of the Institute is fully with the Ministry. The Committee recommends that the Ministry should relieve itself of various day-to-day references made to it by the head of the Institute who should be delegated powers of a Head of the Department. Only important matters of general policy should go to the Ministry.

10.17 The Champion Committee has also suggested that the Ministry might consider whether the position of the Inspector General of Forests should not be strengthened to that of Additional Secretary. This Committee reiterates the above recommendation and feels that imparting of secretariat status to the Inspector General of Forests will facilitate work of the Head of the Institute in obtaining Government's approvals.

10.18 At the same time, the Committee cannot help recording that it is absolutely essential that the administrative load on the head of the Institute be reduced so that he can give some time to directing and controlling the work of the Institute. With the vast expansion of the activities of the Research Institute in recent times, including the establishment of Regional Centres, acceptance of a number of schemes under the aegis of the Ministry like the PL-480 schemes etc., introduction of specialised training courses in seasoning and preservation of timber, cellulose and paper etc., new and arduous responsibilities have fallen on him. In order to enable him to keep abreast of new trends and activities of similar Research Stations in the country and abroad the head of the Institute must get to know each senior worker and his research problems and give him the necessary encouragement. He should visit regularly the various research units and discuss with the Officers their difficulties and try to solve their impediments to work. He should have regular meetings with Branch Officers for the proper co-ordination of work between the Branches and he should decide on general policies, arrange periodical

scientific discussions and symposia with a view to focussing attention of the workers as a whole on important results achieved in the various fields of work. He should pay particular attention to the developmental work involving the evaluation of the economics of processes developed at the Institute which may have commercial application and he should vigorously follow up their application in industry. He should see that the results of research are made known to the world at large and should verify that the standard of scientific value of the papers produced in the Institute is high. He should encourage the production of technical books for the spread of the knowledge of forestry and forest utilisation as a whole. If the head of the Institute is to do all this, it is necessary that he should be relieved of much of the administrative work that he is at present burdened with.

10.19 In order to achieve this the Committee proposes that three senior officers, to be called Deputy Directors, should be appointed to relieve him of the technical and administrative work, one on the Forest Products side, another on the Forestry side and a third in the Education sphere. These three men will replace the four Directors who, as stated above, are serving very little useful purpose. The Deputy Directors should themselves have no research or teaching commitments and should be able to give their full time to administrative matters. Considerable authority should be delegated to them by the head of the Institute to deal with things themselves without troubling him. It is also desirable that these Deputy Directors should further delegate authority in minor financial matters to the Branch Officers to the maximum extent possible.

10.20 The Committee recommends that the designation of the head of the Forest Research Institute and Colleges as 'President' is out of keeping with modern practice and recommends that the post should be re-designated as Director of the Forest Research Institute and Colleges.

(C) Staff Structure

10.21 The Forest Research Institute and Colleges consist of four wings, viz:

- (i) Education;
- (ii) Research;
- (iii) Publicity; and
- (iv) Administration.

The gazetted staff of the Institute is classified into the President (now to be called the 'Director'), the Directors, the Senior Research Officers (Selection Grade), the Registrar, the Accounts Officer, the Senior Research Officers (ordinary Grade-Class I) and the Research Officers (Class II).

Recruitment to those grades falls into the following three categories:

- (i) Staff drawn from State Forest, Departments on a tenure basis;
- (ii) Staff recruited from the open market through the Union Public Service Commission or by promotion from the establishment of the Forest Research Institute and Colleges; and
- (iii) By deputation from Central Secretariat Service and Accounts Service, viz, the Registrar and the Accounts Officer.

10.22 The Committee was apprised of the system and procedure of appointment to and promotion of Research staff in the Institute. The Committee was further informed that the distribution of the staff between the various Branches was left to be decided by the Head of the Institute with regard to the requirements of each Branch and the strength of every Division and Branch fixed with due regard to its importance and volume of work. Having been fixed, this remained rigid so that grade to grade promotion could not be made within a Branch if there was no vacancy in the particular grade in that Branch. The serious effects of this have been mentioned above and proposals for avoiding it are given in para 10.26 below.

10.23 The present rules for recruitment to the various cadres of the research staff are briefly indicated below:

- (a) The President is appointed by selection. He has usually been a Forest Officer on deputation from one of the States and receives a deputation

allowance, but the President has also been appointed from the staff of the Institute.

(b) of the four Directors two are Forest Officers on deputation and the remaining two are Senior Research Officers (Selection Grade) receiving a charge allowance of Rs.100/- per month over and above their basic pay.

(c) Senior Research Officers (Selection Grade)

Scale. Rs. 1300-60-1600

Cent per cent by promotion of Senior Research Officers (Ordinary Grade) with at least five years' service in the grade.

(d) Senior Research Officers (Ordinary Grade)

Scale Rs.700-1250.

Fifty per cent by direct recruitment through the Union Public Service Commission and fifty per cent by promotion of Research Officers with at least five years' service in the grade and possessing the minimum academic qualifications required for promotion, i.e. a Bachelor's degree in the relevant subject. Promotion from Research Officer to Senior Research Officer is made by the Departmental Promotion Committee in the Ministry. The Minimum qualification for promotion is B.Sc., i.e., one lower than that prescribed for direct recruitment which is M.Sc.

(e) Research Officers:

Scale: Rs.350-900.

Sixty-six and two thirds per cent by direct recruitment through the Union Public Service Commission and thirty-three and one third per cent by promotion from Research Assistant (Grade I) possessing the basic academic qualifications for promotion (i.e. a Bachelor's degree in the relevant subject) and possessing three years' service as Research Assistant (Grade I). For direct recruitment minimum

academic qualification is M.Sc. in the relevant subject.

(f) (i) Research Assistant (Grade I - Selection Grade)

Scale: Rs.325-575

Cent per cent by promotion from Research Assistant (Grade I) with at least four years' service in the grade.

(ii) Research Assistant(Grade I)

Scale: Rs.210-425

Sixty-six and two thirds per cent of vacancies are filled by direct recruitment and thirty three and one third per cent by promotion from Technical Assistant with three years' service in the grade and a degree in the relevant subject. For direct recruitment minimum academic qualification is M.Sc.

(g) Research Assistant (Grade II)

Scale: Rs.250-300.

Sixty-six and two thirds per cent of vacancies are filled by direct recruitment and thirty three and one third per cent by promotion from Technical Assistant with three years' service in the grade. For direct recruits the minimum qualification is B.Sc., for promotion matriculation with science as the main subject.

(h) Technical Assistant:

Scale: Rs. 110-200.

Fifty per cent of the posts are filled by direct recruitment and fifty per cent by

promotion from Field Assistant, Meteorological Recorder, Insectory Assistant, Junior Assistant (Museum) etc., with three years' service in the grade. For direct recruits minimum qualification is matriculation with science but preferably intermediate in science.

10.24 For promotion, selection is made by the Departmental Promotion Committee on the basis of the seniority list of eligible candidates. As there is a pool seniority list for the whole Institute it often happens that a person on promotion is posted to a Branch where he is a complete misfit. The serious consequences of this have already been mentioned. The relatively high qualifications required for appointment to the various technical and Research Assistant Grades combined with the very low pay of these grades is the basic cause for the rapid turn-over in these grades.

10.25 The Committee was surprised to learn that although action to frame recruitment rules for non-tenure Scientific gazetted posts in the Institute had been initiated as early as 1950 the rules have not yet been finalised. The Committee trusts that the Government would, since the recruitment rules have already been delayed for so long, take into account the recommendations made in this Report. The Committee would particularly like to stress that, at the moment, according to the latest recruitment rules, certain avenues like those of Forest Entomologists, Forest Botanists, Forest Geneticists, Forest Pathologists, etc., are closed to Forest Officers who may often be well qualified to do research in them. The Committee would, therefore, press that when the rules are revised they should render eligible for those posts such Forest Officers as may have the requisite scientific qualifications or show a bent for research.

10.26 The Committee believes that, in addition to the difficulties mentioned earlier in this Chapter, one of the main reasons for the difficulty in attracting men of high calibre to work at Dehra Dun is the poor pay and conditions of service. In order to obviate all these difficulties, the Committee recommends a revised staff structure as laid out in Appendix VII. The main

features of this are as follows:

- (a) The Director should get pay of Rs.2,000-2,500.
- (b) Three Deputy Directors - one for Forestry, one for Forest Products and one for Education. Their pay would be Rs.1,800-2,000 and they would have no research or teaching commitments, being mainly administrative with the function of relieving the Director of much of the administrative burden he now has.
- (c) Ten posts of Principal Scientific Officer - pay, Rs.1,600-1,800. Seven of these would normally be the officers incharge of the following:
 - (i) Silviculture
 - (ii) Botany
 - (iii) Forest Statistics
 - (iv) Cellulose and Paper
 - (v) Timber Engineering
 - (vi) Bangalore Regional Research Centre
 - (vii) Sandal Spike Disease Research.
Organisation, Bangalore.

There would be three floating posts to be used for the promotion of particularly deserving individuals within their own Branches. The holding of this grade would not necessarily mean that the individual would be head of his Branch though this might often be the case.

- (d) Senior Scientific Officers - pay Rs.700-1250-EB-1600. Crossing of EB at Rs.1250 after approval by a Selection Committee. Apart from the P.S.Os. posts mentioned above, this would be the normal Grade for Branch Officers but there could be other S.S.Os. who were not holding Branch Officer Charge, to provide avenues for promotion for selected Scientific Officers of exceptional ability or merit who may never have the opportunity to hold charge of a Branch.
- (e) Scientific Officers - pay, Rs.400-950

(f) Scientific Assistants - Pay Rs.325-575
(Rs. 400 for M.Sc.)

(g) Technical Assistants - Pay Rs.210-320-EB-425.

On the Education side the rates of pay proposed are:

(a) Principal, Indian Forest College,- Rs.1600-1800

(b) Principal, Southern Forest Rangers College
and officer-in-charge, Coimbatore Regional
Research Centre Rs.1600-1800.

(c) Principal, Northern Forest Rangers College
Rs. 1100 - 1600.

(d) Senior Education Officer(S.E.O.) Rs.700-1600.

(e) Education Officer (E.O.) Rs.400-950.

The Head of the Indian Forest College will be designated Principal, Indian Forest College instead of Dean, Indian Forest College. Similarly, the designations of Lecturers and Instructors will be replaced by Senior Education Officers and Assistant Instructors by Education Officer.

10.27 The Committee recommends the all promotions should be by selection or merit and that no promotion should be made on seniority alone. There should be a Selection Committee which will decide all promotions after examining the reports and, if necessary, calling the individuals concerned for interview.

10.28 During the course of taking evidence from the Officers and their associations at Dehra Dun, the Committee was informed that Government had, in order, to encourage a high quality of research work at all levels, instituted a scheme of "Merit Promotions and Advance Increments". It was understood that this scheme was to have been initiated about three years back and, while various other research institutes like the Indian Agricultural Research Institute had gone ahead with it, no awards had so far been made in this Institute. The

Committee is of the view that early action in this direction may be taken but such awards must be made only to those whose work is considered by the specially constituted committee as particularly meritorious and constituting a real advance in the field of research.

10.29 The Committee also observed that there existed a general feeling among members of the Class III and Class IV services that they did not have adequate prospects of promotion and advancement in the Institute. The Committee recommends that such persons may be given the maximum opportunities for promotion within, of course, the frame-work of the general recruitment rules as amended. Necessary incentive to well-qualified and experienced members of the staff of the Institute may also be considered.

10.30 The Committee records with regret that during most of its meetings with scientists, as well as with Forest Officers of all grades in the Institute, the questions that were raised referred mainly to promotions, pay, allowances and such matters and rarely to problems connected with work. The Committee was also sorry to learn that in this Institute, with nearly one hundred Scientific Officers, it was not possible to organise periodical seminars on research work done within the Institute. The staff in the various Branches appeared to have little interest in what was going on in other Branches. It is important that steps should be taken to ensure that there is the fullest cooperation between the various Branches, particularly the Branches on the Forest Products and the Forestry sides whose interests converge. Although efforts has been made in the past to improve internal relations by having staff seminars at which one member of staff would read a paper followed by a discussion, these were not successful and were abandoned after some time. Staff relations in a large institute are dependent mainly on good administration and leadership from the top. The administrative troubles already enumerated have been quite sufficient to destroy and esprit de corps and to cause jealousies and unfriendly attitudes to arise. The Committee hopes and expects that, if the

administrative changes suggested in this Report are implemented in the right spirit, there should be an immediate improvement in staff relations. Apart from that, the solution lies in the hands of the Director who must be firm and tactful dispensing the right proportions of encouragement and firmness, so as to secure the full loyalty and support, of the staff at all levels. It is recommended that Staff Colloquia should be re-introduced and held at frequent intervals.

(D) Cooperation with Universities and other Organisations.

10.31 The Committee feels that contacts between the Institute, Botanical Survey of India, Zoological Survey of India, the Universities and other Research Institutes should be strengthened. At present there is practically no cooperation between the Institute and these bodies. There are many research subjects of a fundamental nature that could well be undertaken in the various Universities having Botanical, Zoological, Chemical, Bio-Chemical and Engineering Faculties throughout India. These subjects could be suggested to the Universities by the Director of the Institute and discussed with them. This work should, of course, be carried out on Government Grants. Similarly, Universities might suggest some projects of a fundamental nature to be supported by Government Grants at the Institute.

10.32 The Committee would also suggest that, at the same time, facilities should be provided at the Institute for short-term work on the basic problems by University graduates working for higher degrees.

10.33 It is suggested that it would be a good idea to have "Open Days" at the Institute to which Heads of suitable Faculties in the Universities should be invited to see the range of work and the facilities for post-graduate studies offered by the Institute. The possibility of inviting University Professors and Scientists from other Universities and engaging them during the summer months for conducting research work and for giving special lectures at the Institute or in the Forest Colleges may be considered. Similarly, the officers of

the Institute may also be encouraged to deliver lectures to post-graduate University students. The Committee feels that great mutual benefit for both the Institute and the Universities could result from such cooperation.

(E) Liaison with Industries, State Forest Departments etc.

10.34 The Committee was informed that the following ways and means were being adopted at present to maintain liaison with the industry and the State Forest Department:-

- (a) The Research workers of the Institute keep in touch with the practical problems of forest-based industries by frequent visits, by their representation on a number of committees, particularly relating to the industries of paper, plywood, timber, seasoning, timber preservation, matchwood, katha, hardboard etc. A liaison meeting between the Research Officers, 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.
- (b) Liaison between the Institute and the State Forest Departments has been maintained by holding annual meetings with representatives of the State Forest Departments as a regular feature since 1953. At these meetings discussion are held on research techniques and their application to the problems of State Forest Departments. A number of conferences and symposia are held at the Institute, the proceedings of which are communicated to State Forest Departments. The Institute keeps these recommendations in view while formulating its research programmes. Refresher courses for 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.

- (c) The educational programme for Forest Officers and Rangers is organised on behalf of and for the State Governments whose nominees constitute most of the trainees. From this year a limited number of outside candidates are also being admitted. An annual liaison meeting of Forest Officials is held at which deficiencies of the curriculum and the special needs of the States are discussed across the table.
- (d) The Institute offers seven categories of special training courses such as those for apprenticeship in wood technology, paper and pulp manufacture, timber courses for the personal of the Defence Department, advanced Diploma courses in pulp paper technology courses in Forest Entomology, Seasoning and Preservation, Silviculture and Statistics, etc. Candidates are deputed to these courses not only from Government Departments but also from industry.

10.35 The Advisory Board for Research for the F.R.I. which has recently been re-constituted and includes nominees from industry and from Government Forestry, Departments, has set up the following six Committees to review the programmes of research at the Institute and to consider ways of stimulating utilisation of results of research:

- (i) Silviculture;
- (ii) Logging;
- (iii) Timber Engineering;
- (iv) Forest Utilisation;
- (v) Biological Research; and
- (vi) Paper and Pulp.

10.36 In addition to what has been mentioned in para 10.34 (a) above, closer liaison between the Institute and forest industries is maintained by certain amount of touring by the Officers of the Institute, particularly those connected with the Publicity and Liaison Branch in the various States. Contacts with forest officials and representatives of the industries have been helpful in acquainting them with the least achievements in the various fields of research at the Institute and in eliciting from them a number of queries regarding the problems facing them. A Forest Utilisation Officer has been appointed in the Publicity and Liaison Branch of the Institute in order to strengthen and improve Liaison between the forest based industries and the F.R.I.

10.37. Liaison between the Institute and other scientific organisations is maintained by exchange of publications, sending representatives to attend meetings organised in other countries and by organising training courses for their workers in 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 research in other countries the Institute has exchanged relations with about fifty countries and with about three hundred Institutions and Research Departments in various parts of the world.

10.38 Liaison between the Institute and the public is maintained by publishing articles in various journals, newspapers and magazines, the sale and distribution of complimentary copies of Research Papers, the organisation of visits and tours for visitors at the Forest Research Institute who number about 20,000 a year by taking part in regional and industrial exhibitions and by participating in international exhibitions held in India and also abroad and by general publicity by means of posters, popular booklets, brochures, etc. distributed to the Universities, industry, technical Institutions and interested members of the public. The Forest Research Institute also stages exhibits illustrating forestry and forest industrial processes, films are also supplied on loan to various Central and State Government Departments, Educational Institutions etc.

10.39 The Committee was pleased to note the existence of all these means of keeping the Forest Research Institute in touch with the outside World. It, however, wishes to emphasise that in the course of evidence it was informed that the Forestry Departments and the forest industries were not nearly sufficiently aware of what was going on at the Institute. Nor was it felt that the Institute was keeping up with the very rapid technical and industrial developments. This is attributed largely to lack of personal contact between the members of the staff of the Forest Research Institute and the men in the field, both in the State Forestry Departments and in the industries. Repeatedly the Committee was informed that more touring was not done by members of the staff because sufficient funds were not available. The Committee feels that it is essential that more frequent visiting by the staff of the Institute should be made to Forest Departments, especially Forestry Research Branches, to the Regional Centres and to forest industries. Only by wide personal contacts can really adequate liaison be maintained. The issue of masses of publications necessary though it is, is not nearly as effective as the personal touch.

10.40 The Committee became aware that there was a general lack of appreciation of forestry problems by members of the staff of the Institute. This partly is due to the staff not knowing much about forestry. While it is clearly not possible for all directly recruited scientific staff to get forestry qualifications, provision should be made by special short courses for such officers to get a working knowledge of forestry. Such courses could be adopted to the needs of the scientists according to the particular disciplines in which they are working. In some cases attachment to a Forest Department may be desirable. It needs hardly be pointed out that a knowledge of forestry will always be an advantage and sometimes a necessity. A knowledge of forestry and forest utilisation throughout the Institute will in the opinion of the Committee, be a unifying force and should help to give a common aim and direction to the work of all in the Forest Research Institute.

CHAPTER XI
ACKNOWLEDGEMENTS

11.1 The Committee is grateful to the President and the staff of the Forest Research Institute and Colleges, Dehra Dun and its Regional Centres for the close cooperation received from them. The useful material collected by them in advance and the further data provided by them during the course of detailed discussions were of great assistance to the Committee in completing its work. The Committee also desires to acknowledge the valuable assistance rendered by Shri D.H. Kulkarni, Deputy Inspector General of Forests and the Departments of Agriculture. The Committee also wishes to place on record its appreciation of the untiring efforts of Shri S.N. Tulsiani as Secretary of the Committee.

11.2 The Committee is grateful to representatives of various Research Institutes like the Indian Council of Agricultural Research, Indian Council of Medical Research and important wood-based industries (Paper, Plywood and Match), for giving it the benefit of their experience. The Committee acknowledges with thanks the cooperation and the material provided by the Ministry of Railway (Railway Board), the Ministry of Industry (Department of Technical Development) and the Chief Conservators of Forests of all States.

11.3 The Committee records with deep regret the sad demise of Prof. P. Maheshwari, an eminent scientist and Member of this Committee, a few days after he had approved the report.

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CHAPTER XII

SUMMARY OF CONCLUSION AND RECOMMENDATIONS

THE CHANGES BOTH OF RESEARCH IN

FORESTRY AND FOREST PRODUCTS

(CHAPTER III)

1. There is an urgent and imperative need for the country to increase its production of wood as quickly as possible. Not only are larger areas of productive forests required, but a very great increase in the production per hectare under forest is needed. The average level of production from the forests is very low and rates of production considered satisfactory in the past will not serve the purpose now. Low yielding natural forests will have to be replaced by intensive plantations of fast growing species, and every possible way of increasing production from forests must be tried. In this, India will be following the general trend in forestry management all over the world. The scope for increasing production under plantations is immense, and the imminent threat of shortage of wood makes large scale plantations an urgent need.

(Para 3.3)

2. Forest production, unfortunately cannot be raised overnight. Ways must be found to tide over the twenty to forty years before full yields from the planting programmes are realised. Better use must, therefore, be made of the forest produce now available. Waste in utilisation must be cut down to a minimum methods must be found for using species and qualities of wood that are at present unused or are considered unacceptable, and the possibilities of using a far wider range of timber species as raw materials for industry must be investigated.

(Para 3.4)

3. It is, therefore, to this new and challenging situation that forest research must adapt itself. The Committee, in the course of its investigations, gained the impression that in many branches, there was inadequate appreciation of the seriousness of the situation and the research programmes at the F.R.I. did not show any sense of urgency. Many items on current programmes, though

possibly or theoretical and academic interest are not likely to give practical results which may be either commensurate with the expenditure involved, or which may lead to increased production from forests. Research at the Institute seems to be out of touch with the problems of the State Forest Departments and with industries based on forest produce.

(Para 3.5)

4. Research at an Institute of this nature should have clear, practical objectives. The main objectives must be to discover ways to improve production from all types of forests as far as possible and to utilise the produce from both natural forests and plantations more efficiently so as to make the best use of the inadequate forest resources of the country. Clear priorities must be established for those items that will have the greatest and most immediate impact on productive forestry in the States.

(Para 3.6)

5. The Committee emphasises the need for the staff of the Institute to keep in much closer touch with the Forest Departments of the State and with forest industry so as to be alive to the most urgent problems requiring attention, and be able to provide the necessary technical and scientific guidance.

(Para 3.6)

6. The Institute should give priority to research into those aspects of silviculture, forest genetics, ecology, pathology and entomology that are aimed at determining the best and most rapid methods of increasing the productivity of the forests of India. Research in wood technology, timber engineering, cellulose, pulp and paper manufacture and the chemistry, collection and cultivation of minor forest products is equally urgent for the more effective utilisation of forest products. There is also a need for the development of more efficient and less wasteful methods of extracting and converting forest produce. Rapid advances in forest science and technology in other parts of the world since World War II have to be studied and adapted to India's requirements.

(Para 3.7)

THE STATUS OF THE INSTITUTE

(CHAPTER IX)

7. The Institute and colleges have, in addition, the responsibility for training men for administering the forest estates of India and for manning the Forestry and Forest Products Research Organisations. In order to remove the anomaly that the Colleges are at present unable to give degrees for this training, placing Indian Forest Officers at a disadvantage vis-a-vis men trained in foreign Universities to the same levels, and further in order to provide facilities for staff, students and Forest Officers alike to do research for higher degrees at the Forest Research Institute, the Committee recommends that the Institute and Colleges together be declared an "Institute of National Importance" by special Act of Parliament on the pattern of the Indian Institute of Technology.

(Para 9.1 to 9.8)

8. Following such a declaration, a Committee should specially appointed for dealing with such matters as formulating the Constitution, determining the composition of various authorities, such as the Governing Council, Senate, etc.

(Para 9.8)

9. In order to ensure that the Institute fulfils the functions enumerated in paras 1 to 6 of this chapter and that its relationship with the State Forestry Departments is maintained and strengthened, it is recommended that the Governing Council of the Institute should include the Inspector General of Forests and the Director of the Institute as ex-officio members together with three Chief Conservators of Forests on tenures of office, rotating among the States, as well as a prominent Forest Industrialist, an Educationalist, and a member with special experience of science and research.

10. A suitable screening committee should also be appointed for the purpose of determining the suitability or otherwise of the present staff, having regard to the suggestions made for the re-orientation of the work of the Institute.

(Para 9.9)

ADMINISTRATION

(CHAPTER X)

STRUCTURE OF THE FOREST RESEARCH INSTITUTE

11. In conformity with general practice, the Head of the Institute should be redesignated as "Director of the Forest Research Institute and Colleges".

(Para 10.20)

12. The Director should, as far as possible, have the following qualifications:-

Firstly, he should possess an intimate knowledge of Forestry and Forest management in the field, and of the problems of utilisation as affecting management, and furthermore, of forest management for different forms of industrial activity.

Secondly, he should be a good scientist and be able to distinguish good research from bad, and able to guide research officers in their work.

Thirdly, he must have the personal qualifications necessary to enable him to control a large and mixed staff and to maintain good personal relations between them.

Fourthly, he must be a strong administrator with sufficient drive and independence of mind to be able to cut through red tape and to delegate responsibilities to others.

(Para 10.15)

13. The Director should have the full powers of the Head of a Department and only matters of major general policy need be referred to the Ministry (or to the Governing Council when the Institute is created as Institute of National Importance).

(Para 10.16)

14. The four Directorates at present existing should be abolished.

(Para 10.14)

15. In place of the existing four Directors, three posts, to be termed 'Deputy Directors' should be created, one in charge of Forestry, one in charge of Forest Products and one in charge of Education. As the function of these Deputy Directors is to relieve the Director of much of the load of technical and administrative work at present falling on him, they should not have any research or teaching commitments and considerable authority should be delegated to them by the Director. It is also desirable that the Deputy Directors should delegate authority to the Branch Officers to the maximum extent possible.

(Para 10.19)

16. The Deputy Director for Forestry should look after the following Branches - Silviculture (including General and Experimental Silviculture, Seeds and Nursery, Mensuration and Forest Inventory, Forest Influences, Ecology, Soil Science, Plant Physiology, Fire Protection Research and Documentation (Silviculture and Genetics)), Botany, Genetics (including Tree Breeding and Plant Genetics), Wood Anatomy, Pathology, Forest Entomology, Minor Forest Products, Forest Statistics, Forest Economics and Logging, in addition, Southern Forest Research Centre at Coimbatore will be technically under him.

(Para 10.19 & App. VII)

17. The Deputy Director for Forest Products will look after the following Branches - Chemistry of Forest Products, Cellulose and Paper, Composite Wood, Wood Preservation, Wood Seasoning, Timber Engineering, Timber Mechanics, Forest Utilisation and Library and Documentation. In addition, Bangalore Regional Research Centre will be technically under him. However, Sandal Spike Disease Research Organisation located at Bangalore Research Centre will be directly under the Director.

(Para 10.19 & App. VII)

18. The Deputy Director for Education will have the same functions as the present Director of Forest Education.

The following Branches will be directly under the Director:

Sandal Spike Disease Research Organisation at Bangalore Research Centre, Publicity and Liaison (including Photo Section, FRI Press and Museums), Officer on Special Duty (Publications) and Registrar.

(Para 10.19 & App. VII)

19. In order to expedite the disposal of matters that have to be referred to Government, the Ministry should consider raising the status of the Inspector-General of Forests to that of Additional Secretary.

(Para 10.17)

FORESTRY RESEARCH

(CHAPTER IV, Paras 4.1. to 4.77)

20. As all biological research is, or should be, directed towards the improvement of forestry practice the distinction between the biological branches and the forestry branches should be allowed. The branches and sections included under the Deputy Director (Forestry) are detailed in Appendix VII.

SILVICULTURE BRANCH

21. The Silviculture Branch which is the largest and most important branch in the Institute needs to be headed by an exceptionally competent officer. He should be appointed by special selection.

(Para 4.4 and 4.17 (ii))

22. The Branch needs strengthening to cope with the increased scope and urgency of the work and for maintaining closer contacts with State Forestry Departments and Regional and State Forest Organisations.

(para 4.17 (ii))

23. In order to achieve this better contact, much more travelling should be done by the Silviculturist and his staff. There should be adequate allocation of funds for organising regular touring in all the States.

(Para 4.17 (x))

24. The appointment of Silvicultural Liaison Officers under the Central Silviculturist but attached to Regional Centres is recommended.

(Paras 6.9 and 6.13(1))

25. The sections of the Silvicultural Branch should be reorganised as follows:

Existing Sections

- (1) General Silviculture
- (2) Experimental Silviculture
- (3) Mensuration
- (4) Forest Influences
- (5) Ecology
- (6) Soils
- (7) General Documentation

Proposed Sections

- (1) General and Experimental Silviculture (excluding resin tapping)
- (2) Seeds and Nurseries.
- (3) Mensuration and Forest Inventories.
- (4) Forest Influences.
- (5) Ecology) See recommendation 30 below.
- (6) Soil Science.)
- (7) Plant Physiology
- (8) Fire Protection Research
- (9) Documentation (Silviculture and Genetics only).

Resin tapping research should be transferred to the Minor Forest Products Branch and general documentation should become a Central Library function, leaving Silviculture with its domestic documentation on silviculture, and genetics.

(Para 4.17)

26. The research programmes of the Silvicultural Branch and its various sections are seriously over-loaded with many items of doubtful value. They should be carefully weeded and confined to items of practical importance to the State Forestry Departments.

(Para 4.17 (v))

27. The general and experimental silviculture section should deal with general silvicultural problems affecting the States (apart from Seeds and Nurseries). It should also be responsible for liaison with State Silviculturists and for co-operating with them on their experimental programmes.

(Paras 4. 7 (vi) & vii))
28. A major item of high priority within this section should be research into the creation of plantations of fast growing species, especially, pines and the establishment of coordinated species trials over a wide range of sites in the States. One Officer should have this as his sole responsibility.

(Para 4.17 (iv)).

29. There should be a separate section for Seed and Nursery research.

(Para 4.17 (vi))

30. The programmes of the Soils and Ecology Sections in particular should be scrutinised by a competent Silviculturists and co-ordinated. The work should be concentrated on problems of interest to the States for the improvement of silvicultural practice, and item of little prospective practical value should be eliminated.

(Para 4.10 to 4.12 and 4.17(vii))

31. The Plant Physiology Section at present with the Botany Branch, should be transferred to the Silvicultural Branch. (For further recommendations regarding the Plant Physiology Section see Recommendations No.s 50 to 52 below).

(Para 4.27 (i)).

32. The Mensuration Section should remain in the Silvicultural Branch though it should work in the closest co-operation with the Statistical Branch in regard to computation of results and the planning of surveys and enumerations etc. The programme of the Branch requires radical revision.

(Para 4.8)

33. The work of the Forest Influences Section requires examination to ensure that it is concentrated clearly defined problems of interest to the State Forest Departments. Any proposed research projects should be scrutinised by the Statistician.

(Para 4.9)

34. The appointment of a Fires Protection Research Officer is recommended as head of a Fire Protection Research Section. He should be sent for training to the U.S.A. or Canada.

(Para 4.10)

35. General documentation, which is at present being done in the Silviculture Branch, should become a Central Library function, leaving Silviculture with its own domestic documentation which should include the documentation of the Genetics Branch.

(Paras 4.14 and 4.113 - 4.119 and recommendations Nos. 25 and 115)

FOREST GENETICS BRANCH

36. The Forest Genetics Section, at present working in the Botany Branch, should be raised to the status of an independent Branch and should work in the closest cooperation with the Silviculture Branch. At this stage its problems are mainly concerned with tree breeding and the selection and testing of superior phenotypes and genotypes and its work will be to a great extent dependent upon the assistance and co-operation of the State Silviculturists. It may also have to work through the Silvicultural Liaison Officers.

(Para 4.29) (i))

37. At the present stage of development, most of the time of the staff of the Genetics Branch should be spent in the field and devoted to selection of seed stands and plus trees, the collection of material and the organisation of seed orchards and progeny trials.

(Para 4.29(ii))

38. The closest co-operation should be maintained with the wood Anatomy , Timber Testing and Cellulose and Pulp Branches and the quality of wood of selected pheno-types should be assessed right from the start. Field parties collecting material for tree breeding should be supplied with proper boring equipment for the extraction of large cores of wood suitable for examination by the Wood Anatomy Branch.

(Para 4.29(iii)).

39. Certain aspects of tree breeding such as the inter-pollination or selected individuals in tree orchards to discover parents of good combining ability which produce superior off-spring, and hybridization should be given lower priority at this stage. For the first few years maximum attention should be concentrated on the selection of plus trees and seed stands and the production of superior seed from them in quantity for use in the field.

Para 4.29(iv)).

40. Work on certain species may be more efficiently attended to in the Regional Centres which should be adequately staffed and equipped for this purpose.

(Para 4.29(v)).

FOREST BOTANY BRANCH

41. The Forest Botany Branch should be made an independent Branch and should be adequately staffed. The earlier position of the Branch as one of the most important Branches of the Institute should be restored.

(Para 4.24(i)).

42. The Branch Officer's title should be "Forest Botanist and keeper of the Herbarium".

(Para 4.24(ii)).

43. The Branch Officer should be a highly qualified Systematic Botanist and should be fully conversant with the latest trends and techniques in systematic botany, including biometric methods. The post

should be filled by special selection.

(Para 4.24(ii))

44. Adequate staff should be provided for the Branch, both in the higher and lower grades. There should be at least two Senior Research Officers and one or more posts of Research Officers in addition to the Curator of the Herbarium. The Taxonomist who was transferred to the Plant Pathology Section should be re-transferred to this Branch.

(Para 4.24(iii)).

45. The work of the Branch should be the revision of families of forest importance and also the revision of regional forest floras according to up-to-date taxonomic methods and concepts. It will also have functions of identifying material sent in to it by the State Forest Departments and others, and it should help the Geneticist in the biometric determination of genotypes and hybrids.

(Para 4.24(ii) & (iv)).

46. The Branch should make arrangements for Co-operative research with the Botanical Survey of India in such a manner that, in any particular area of India, the woody species are studied as a rule by this Branch and the herbaceous phanerogams and cryptogams are studied by the Botanical Survey.

(Para 4.24 (v)).

47. The Herbarium, which is an exceedingly

valuable collection should continue to be actively developed and it should be properly housed in air-conditioned rooms. This should be arranged in a new building with air-conditioning arrangements. The wooden cabinets containing the specimens should be made insect-proof and dust-proof.

(Para 4.24(vi)).

48. The Branch should also maintain the Botanical Garden and Arboretum and grow such species as are of botanical interest or are of educational value in the Forest Colleges and for University students engaged in research.

(Para 4.24 (iv)).

49. The Botanical Garden and Arboretum in the Institute campus should be put under the direct charge of a qualified Curator working under the Forest Botanist.

(Para 4.24(vii)).

PLANT PHYSIOLOGY SECTION

50. As mentioned in Recommendation No.31 above, the Plant Physiology Section should be transferred to the Silvicultural Branch. The programme of the Physiologist should be drawn up in close consultation with the Silviculturist and the Geneticist and should be confined to problems that are of practical interest to those two Branches.

(Para 4.27(ii)).

51. If the Plant Physiologist has to deal with any nutritional problems these can be studied in collaboration with the Soils and Ecology Sections which have laboratory facilities.

(Para 4.27 (iii)).

52. The Physiologist should be moved out of the laboratory wing in the Chemistry Branch and should be provided with such laboratory facilities as he needs in the Soils and Ecology Sections.

(Para 4.27(iv)).

WOOD ANATOMY BRANCH

53. The possibility of reducing "Police Work" in the Wood Anatomy Branch or of providing it with separate skilled staff to deal with the work should be investigated.

(Para 4.34)

FOREST PATHOLOGY BRANCH

54. A properly organised quarantine station should be established, either by the Forest Research Institute under the Pathologist or in conjunction with any similar station which may exist for agricultural material.

(Para 4.39(i)).

55. The Systematic Botanist, transferred from the Botany Section to the Pathology Branch for work on mycorrhiza, should be transferred back to the Botany Branch.

(Para 4.39(ii)).

56. Compilation of the book "Indian Forest Pathology" should be given high priority.

(Para 4.39(III)).

SANDAL SPIKE DISEASE RESEARCH

57. Research in control of Sandal Spike Disease should be intensified. It is necessary to apply modern virological techniques to isolate the virus, purify it, determine its diagnostic characteristics and the possibility of culturing it on other easily handled plants. Then the virus should be looked for in other plants, commonly associated with Sandal in the Spike Disease areas.

(Para 4.44(i)).

58. This work which is highly specialised should be assigned to competent and experienced Plant Virologist of the grade of P.S.O., assisted by another well qualified Virologist, a Forest Ranger or Forester with horticultural or nursery experience (to run field stations), a Botanist - preferably one well acquainted with the flora of the types of forest in which sandal grows - and an Entomologist. Bangalore is probably the best centre for this work.

(Para 4.44(1)).

ENTOMOLOGY BRANCH

59. The Entomology Branch should be strengthened by the re-instatement of a qualified Systematic Entomologist and by the addition of more field entomologists some of whom may be stationed at Regional Centres. The post of Systematic Forest Entomologist should be filled quickly.

(Para 4.53 (i)).

60. Adequate funds should be provided for both the Central and Regional staffs so that field investigations on outbreaks of insect pests can be carried out expeditiously.

(Para 4.53(ii)).

MINOR FOREST PRODUCTS BRANCH

61. The programme of the Branch should be rationalised by eliminating items of minor importance and concentrating on those minor forest products which are of high value or which have been earning foreign exchange by way of exports.

(Para 4.60 (i) & (v)).

62. The chemical assessment of active principles in minor forest produce and the development of economic methods of extracting essential oils, drugs, etc., should be done in the Chemistry Branch in collaboration with the Minor Forest Products Branch. Special staff for dealing with the minor forest produce as a priority assignment should be maintained in the Chemistry Branch, and the programmes of the two Branches should be intimately co-ordinated.

(Para 4.59 & 4.60(iii)
& Recommendation 81).

63. Research on tapping of Sterculia urens and Boswellia serrata for gum should be intensified. Analogous work on tapping Chir Pine for resin be transferred from the Silvicultural Branch to the Minor Forest Products Branch.

(Para 4.60 (iv))

64. There should be closer collaboration between this Branch and the Central Indian Medical Plants Organisation, the Central Drugs Research Institute and other research organisations engaged in work on medical plants as also with the pharmaceutical and chemical industries.

(Para 4.60 (vi)).

65. The Branch should have its own facilities for propagation, multiplication, testing and distribution of seed rather than depend on the Genetics Unit as at present. However, the Geneticist may be consulted for selective breeding.

(Para 4.60 (vii)).

66. Surveys of resources of minor forest products should normally be organised by the Branch through the State Silvicultural Branches. Such surveys should be carried out according to suitable sampling procedures laid down in consultation with the Statistician.

(Para 4.60 (viii)).

67. The need for work on introduction and cultivation of canes should be reviewed in the light of their recent replacement for many purposes by cheap plastic materials.

(Para 4.60 (ix)).

68. Steps should be taken to develop essential oil-bearing plants which yield perfumes and flavouring materials which are imported at present.

(Para 4.60 (x)).

69. Better facilities for documentation and for dissemination of information about the full range of minor forest products in India must be provided as a matter of priority.

(Para 4.60 (xi)).

70. The Branch, in view of its close association with silviculture, should be transferred from the Forest Products Division to the Forestry Division.

(Para 4.60 (xii)).

STATISTICAL BRANCH

71. The vital importance of the statistical Branch to the Forest Research Institute should be recognised by up-grading the post of Statistician.

(Para 4.61 - 4.69 and 4.70 (i)).

72. A suitable digital computer should be installed in the Branch. This should ultimately be in air-conditioned accommodation and hence the whole Statistical Branch with its computer should be accommodated along with the Herbarium in the new air-conditioned building. The provision of the computer should not, however, be delayed until this building is ready.

(Para 4.70 (ii) & (iv))

73. All Branches should be encouraged to consult the Statistical Branch and make use of its services to the maximum extent possible.

(Para 4.70 (iii)).

FOREST ECONOMICS

74. A Forest Economics Branch should be established to carry out the functions detailed in para 4.71(a) to (e). The Head of the Branch should preferably be a Senior Forest Officer specially trained in forest economics. The work of the Branch should be closely associated with the Statistical Branch.

(Para 4.71 & 4.72).

LOGGING BRANCH

75. The Logging Branch should be staffed by Forest Officers who have been specially trained in logging and they should have time to become experts in their subjects. Short-term deputation of Officers as Heads of such branches should be avoided.

(Para 4.73 - 4.76 & 4.77 (11)).

76. Research on Logging tools and mechanised means of improving timber extraction should be intensified.

(Para 4.77(iv))

77. A section on work science studies should be added to the Branch.

(Para 4.77 (i)).

78. A separate mechanical development section should be established for developing machines for the mechanisation of forestry operations from the nursery to final felling and extraction.

(Para 4.77(v)).

FOREST PRODUCTS RESEARCH

(CHAPTER IV. Paras 4.78 to 4.108)

CHEMISTRY OF FOREST PRODUCTS BRANCH

79. The programme of research in the Branch should be critically scrutinised to ensure that the limited resources of the Branch are concentrated on items likely to be of the greatest economic importance.

(Para 4.83 (vi))

80. The programme of work of the Branch should be closely co-ordinated with work in the Minor Forest Products Branch.

(Para 4.83 (i) & (ii))

81. The Chemistry Branch should do the chemical analysis required by the Minor Forest Products Branch. The chemical laboratory run by the Minor Forest Products Branch should be closed down and the Chemist transferred to the Chemical Branch. He, with further extra help, should give priority to the analysis needed by the Minor Forest Products Branch.

(Para 4.83 (iii))

82. The laboratory wing at present occupied by the Physiologist should be returned to the Chemistry Branch and alternative accommodation arranged for the Physiologist.

(Para 4.83(iv) &
Recommendation No.52)

83. The Branch needs strengthening and a larger budget for chemicals and reagents etc. should be provided.

(Para 4.83 (vii))

CELLULOSE AND PAPER BRANCH

84. If, as recommended by the Thirumala Rao Committee, a Co-operative Research Institute is to be constituted for the paper industry, it should be established at a place other than Dehra Dun.

(Para 4.86(ii))

85. Notwithstanding the establishment of such a Research Institute the present Cellulose and Paper Branch should continue at Dehra Dun in the Forest Research Institute. It should conduct research on the technology of making pulp from unconventional new materials such as bagasse grasses and hardwoods which are available in Indian forests in large quantities.

(Para 4.86 (i) & (iii))

86. The small paper mill of six tons daily capacity should be always available for research and training. When not being used for research it should be run regularly to produce paper, especially high priced paper of special types required by Government. Adequate funds should be provided for this purpose.

(Para 4.86 (iii))

87. The proposal for increasing the capacity of the pulp plant may not be necessary and should be dropped. It will, however, be necessary to provide adequate funds for staff, raw materials and maintenance spares for operating the paper machine continuously for the production of speciality papers.

(Para 4.86 (iv))

88. The staff should be fully conversant with the Operational features of production mills so that they can, approach problems of the industry in a realistic manner. This will mean more frequent visits by members of the staff to the mills of the paper industry in different parts of the country.

(Para 4.86(v))

COMPOSITE WOOD BRANCH

89. The programme of the Branch should be scrutinised, cutting out those subjects that are unlikely to be of economic importance and giving higher priority to those that are of primary economic importance to forest utilisation and forest industry.

(Para 4.92 (iv))

90. The book on 'Composite Wood' should be published quickly.

(Para 4.92 (iii))

91. In order to popularise the products of the Branch it, should have a show room where the public can see the products.

(Para 4.92 (ii))

92. Wood-working research should be developed and a full range of standard woodworking tests should be introduced and the necessary equipment obtained. The results of the woodworking tests should be included in the comprehensive testing of timber-see Resolution No.104, below.

(Para 4.89 & 4.92(i))

WOOD PRESERVATION BRANCH

93. The Branch should be immediately transferred back to the Forest Products Division.

(Para 4.95)

WOOD SEASONING BRANCH

94. The post of Head of the Branch should be filled quickly and it should have its full complement of staff.

(Paras 4.97 & 4.100(i)
& (ii))

95. There should be more frequent personal contacts between the Officer-in-Charge of the Branch and the timber industry.

(Para 4.100(iii))

96. Work relating to 'Survey of Timber Industry in India' should not be the responsibility of this Branch and should be transferred to the Forest Utilisation Officer (See Recommendation No.110 below)

(Para 4.100(iv))

TIMBER MECHANICS BRANCH

97. The Officer-in-Charge of the Branch should visit State Forestry Departments and discuss their needs for timber testing.

(Para 4.108(iii))

98. When supplied of materials for testing are being arranged, the Officer-in-Charge should ensure that these are being collected according to proper sampling procedures. Advice on this should be obtained from the Statistician.

(Para 4.106)

99. The amount of timber obtained should be sufficient for comprehensive testing in this and other Branches. (See Recommendation No.104 below)

(Para 4.91)

100. The vast quantities of statistical data on timber testing should be scrutinised by an expert statistician with a view to seeing whether it is worth putting them on to computer tape for storage, analysis and combination with future data.

(Para 4.106)

101. A machine for fatigue testing of timber should be installed in the Branch.

(Para 4.108(iv))

102. The potentialities of stress-grading should be investigated and the introduction of stress-grading machines considered.

(Para 4.108 (iv))

103. The closest co-operation and liaison should be maintained between the Timber Mechanics Branch and the Timber Engineering Branch. The latter is dependent upon data supplied by the former.

(Para 4.107)

COMPREHENSIVE TIMBER TESTING

104. The desirability of organising comprehensive testing of timber consignments so as to obtain correlated data for mechanical properties, seasoning properties, durability and preservative properties, woodworking properties, veneering and pulping properties should seriously be considered. Anatomical characteristics should also be included. This will involve co-operation between all the Branches concerned and the results should be collated and published for each species tested in this way. Such comprehensive testing will become especially important when comparing the properties of plantation grown and natural forest timber.

(Paras 4.91 & 4.92(1) &
Recommendation No.92 above.)

TIMBER ENGINEERING BRANCH

105. Research on the increased use of secondary species of timber, after seasoning and preservation treatment should be intensified and the use of small dimension timbers in structures should be encouraged. The Government Departments responsible for buildings and construction should be persuaded to adopt the techniques and designs for the use of secondary timbers to the maximum extent possible.

(Para.4.105(i)&(ii))

106. More staff and funds should be provided for extension work. Where private parties are charged the cost of extension work, only the actual travelling and subsistence expenses of the staff should be charged.

(Para 4.105(iii) & (iv))

107. The disparity between the pay of the staff of this Branch and that of other Branches should be removed as it is a source of serious discontent.

(Para 4.105(vii))

108. Special equipment for testing the strength of structures recommended by the previous Review Committee, should be installed at the earliest possible date. Foreign exchange should be released by Government, if necessary.

(Para 4.105(vi))

FOREST UTILISATION OFFICER

109. The Forest Utilisation Officer should be placed under the Deputy Director of Forest Products and not under the Publicity and Liaison Officer. His terms of reference need to be more clearly defined.

(Para 4.109)

110. He should take over from the Seasoning Officer and the work relating to 'Survey of Timber Industry in India' vide recommendation No.95 above.

LIBRARY AND DOCUMENTATION

111. The Librarian and a selected member of the library staff should be sent for training in forest librarianship to the Commonwealth Forestry Institute, Oxford. Later when the new Library has been built. The Librarian of the Commonwealth Forestry Institute may be invited to India to assist in organising the Library on proper lines.

(Para 4.112 (iii))

112. The Library should take a sufficient number of copies of the "Centralised Title Service" of the Commonwealth Forestry Bureau to form a basis for its card indexes.

(Paras 4.111 & 4.112(ii))

113. The Library must have assured continuity of availability of foreign exchange for the purchase of books and periodicals. Gaps in series of periodicals which have been caused by the sudden cutting off of funds, should be filled.

(Para 4.112 (i))

114. In order that documentation is complete and unbiased towards any Branch, the function of complete classification information under the O.D.C. should be undertaken as a Central Library function by trained documentation officers with forestry and forest products knowledge. See also Recommendation No.35 above.

(Para 4.119)

THE NEW LIBRARY BUILDING

115. A new Library Building, recommended by the previous Review Committee, is now very urgently required. It should be air-conditioned and in order to make the best use of the air-conditioning it should also house the Herbarium and the Botanical Laboratories and the Statistical Branch with its digital computer. A revised plan should be drawn up and the building put up as a matter of the highest priority. In the revised plan there should be adequate provision for shelf space, stack room and reading space. Air conditioned accommodation should also be provided for the photographic collection.

(Paras 4.121, 4.122 & 4.123
& Recommendation Nos. 47,
72 and 122)

CENTRAL SERVICES

(CHAPTER - V)

PUBLICATIONS

116. If the Government printing presses cannot print the publications of the Institute expeditiously, the F.R.I. should be allowed to have them printed commercially. Publications which are of the immediate interest to industry or for education, and all priced publications should be allowed to be printed by private presses.

(Para 5.7)

EDITORIAL BOARD

117. The Editorial Board should be suitably re-designated and made a permanent Branch of the Institute.

(Para 5.11(i) & (vii))

118. There should be no disparity between the pay of the staff of this Branch and that of other research Branches.

(Para 5.11 (iv))

119. A Production Officer of the rank of Research Officer should be added to the Branch.

(Para 5.11(vi))

120. In the revisions of Troup's "Silviculture of Indian Trees" and Trotter's "Manual of Forest Utilisation", the original language of these portions which are adjudged suitable may be retained subject to any factual changes which may now be necessary. Individual chapters of these compilations should be submitted to Experts for critical comments before issue.

(Para 5.11(ii) & (iii))

PHOTOGRAPHY

121. The Photographic Section should be provided with adequate equipment both for still and cinema photography so that it can provide the necessary services for the Publicity and Liaison Branch and the Research Branches.

(Para 5.4)

122. The valuable photographic collection dating a back to the early days of the Institute should be immediately removed from the damp, insect infested place where it is at present stored and kept in a dry place. It should be stored ultimately in an air-conditioned building.

(Para 5.4)

ACCOMMODATION

123. The Institute should become fully residential and urgent steps should be taken to provide accommodation for the staff of all grades in the F.R.I. campus.

(Para 5.17)

124. Suitable residential accommodation should also be provided for trainees and other visitors working at the Institute for limited periods.

(Para 5.18)

125. Adequate office and working space should be added to the Research Institute and Colleges as and when necessary.

(Para 5.15 and
Recommendation No. 115).

126. Maintenance of buildings and premises at New Forest should be transferred from the Central Public Works Department to the Institute. The desirability of new buildings being put up by the Institute instead of by the C.P.W.D. should also be seriously considered.

(Paras 5.21 and 5.23(v)
and (vi))

127. More attention should be paid to better maintenance of the grounds of the estate.

(Paras 5.22 and 5.23(vii))

REGIONAL RESEARCH CENTRES

(CHAPTER - VI)

SOUTHERN RESEARCH CENTRE - FOREST RESEARCH LABORATORY, BANGALORE

128. The programmes of the Forest Research Laboratory, Bangalore, should be reoriented in the light of the local needs and its work be conducted under the guidance of the corresponding research or technical branches of the F.R.I. An appropriate Scientific Committee may be sent up for drawing up the programme of work of the Centre.

(Para 6.6)

129. Work relating to timber identification and the study of the microscopical characters of timbers etc., should be done at the F.R.I. Dehra Dun, and not duplicated in the Timber Utilisation Section of the Southern Research Centre, Bangalore. There also appears to be no need for the Wood Preservation, Chemistry and Minor Forest Products Sections at Bangalore.

(Para 6.5)

130. Special arrangements will have to be made for dealing with spike disease of sandal as mentioned in recommendations Nos. 57 and 58.

SOUTHERN FOREST RESEARCH SUB-CENTRE, COIMBATORE

131. The current work of the Silvicultural Section at Coimbatore should gradually be wound up and transferred to the State Silviculturists.

(Para 6.13(i))

132. The Regional Silviculturist should act mainly as a liaison between the Central Silviculturist at Dehra Dun and the State Silviculturists, as well as a co-ordinating Officer between the latter within the Regions. He should also act as Liaison officer between Dehra Dun and the State Silviculturists in such other matters as tree breeding (Genetics Branch) and any other forestry research activities that will normally be executed in the field by the State Silviculturists. He must also keep Dehra Dun informed of the problems and activities of the State Silvicultural Research Branches.

(Para 6.13(ii))

133. Only where the States in a Region do not have efficient Silvicultural Research Branches should the Regional Silviculturist actually organise the carry out research.

(Para 6.13 (iii))

134. In the new Regional Centres, the organisation, terms of reference and duties of the Regional Silviculturists will have to be worked out for each Region in relation to the existing State Silvicultural Research organisations.

(Para 6.13 (iv))

135. In all cases, the Regional Silviculturists will be responsible for organising work on items of the programme of the Central Silviculturist concerning the Region.

(Para 6.13 (v))

136. The Entomology Section be considered as an out-station of the Entomology Branch of the F.R.I. and the Regional Entomologist should give priority to the problems of the region. should

(Para 6.13 (vi))

137. The title of the Mycology Section should be changed to Pathology Section and it should be regarded as an out-station of the Pathology Branch of the F.R.I. Dehra Dun.

(Para 6.13 (vii))

138. The Botany Section should also be regarded as an out-station of the Botany Branch of Dehra Dun under the control of the Branch Officer.

(Para 6.13(ix))

139. Adequate funds should be provided for touring by Regional Research Officer within the region. They should also visit Dehra Dun at frequent intervals.

(Para 6.13(x))

140. Proper buildings, laboratory facilities and equipment should be provided and residential accommodation should also be provided for the staff.

(Para 6.13(xi) & (xii))

GENERAL PROPOSALS FOR REGIONAL CENTRES

141. The Regional Centres proposed to be established at Gauhati and Jabalpur should similarly be -sub-stations of the Forest Research Institute, and their work must be controlled on the technical side by the corresponding Branches of the Institute.

(Para 6.15)

142. The work of these new Centres should, it is suggested, follow the lines proposed for the Coimbatore Centre. Forest Products Research seems inappropriate in them.

(Para 6.15)

143. The time is not yet ripe for setting up a Centre in the Andamans. There should, however, be a Silvicultural Research Officer in the Andamans and possibly a Utilisation Research Officer who could, under guidance from the Institute, tackle the specific problems of the Islands.

(Para 6.16)

RESEARCH PROGRAMMES AND UTILISATION OF RESULTS

(CHAPTER VII)

144. The research programmes should be scrutinised by the various sub-Committees of the Advisory Board of Research in consultation with the Research Officers concerned.

Particular attention should be given to reduction of programmes by the elimination of unpromising items especially those that have been on the programmes for many years. Priority should be given to items making a direct practical contribution to the general objectives already defined and should be judged on economic criteria wherever possible.

(Para 7.2)

145. Where research leads to results capable of commercial exploitation, proposals for pilot plant trials should be drawn up by the scientific staff in collaboration with probable sponsors and there should be a guarantee that the funds provided for the plants are adequate to ensure a thorough techno-economic assessment of the process under study. The Institute should embark upon major pilot plant research only when a substantial portion of the expenditure is borne by either a private or public sector of the industry or where a specific grant is made by a Central Ministry or a State Government.

(Para 7.4 & 7.6)

FORESTRY EDUCATION

(CHAPTER VIII)

146. In each Forest College, ten percent of the seats should be kept for non-Forest Departments nominees including industry-sponsored candidates. This percentage can be increased or decreased depending on the response.

(Para 8.2)

147. The members of the teaching staff of the Colleges should be encouraged to do research at the F.R.I. and work for higher degrees.

(Para 8.4)

148. When the F.R.I. gets the Status of an Institute of national importance, the students of the Forest College who have aptitude for research should be given opportunities for working for higher degrees at the Institute. Forest Officers in service in the States should also be given similar opportunities.

(Para 8.6)

149. Appropriate administrative arrangements should be made to ensure that senior research staff of the F.R.I. participate in teaching at the Indian Forest College.

(Para 8.5)

150. The syllabuses of the College courses should be revised by the Panel on Forestry Education, keeping in view of the changing needs of the country and the latest developments in the field.

(Para 8.7)

151. Text books on forestry should be written by senior officers who are experts in the concerned subjects on payment of suitable honoraria.

(Para 8.8)

152. There should be some arrangement for teaching foreign languages such as Spanish, French, German and Russian and for the translation into English of scientific works in these languages.

(Para 8.9)

ADMINISTRATION

(CHAPTER-X)

153. Scales of pay should be the same for the directly recruited scientific and for Forest Officers coming on deputation. Introduction of unified pay scales should not await the change in status of the Institute.

(Para 10.7)

154. All research posts should be open to Forest Officers from the States and to directly recruited scientists alike.

(Para 10.9)

155. Short-term deputation of Forest Officers from the States should be stopped. Instead a two-year probationary period of deputation should be followed by a five-year stay with the option of extension for further periods. It should thus be possible for Forest Officers from the States to make a career in forest research.

(Para 10.10)

156. Arrangements must be made whereby men can be promoted within their disciplines; this may take the form of creation of a number of supernumerary posts which can be allocated at various levels to different Branches. The present practice of transferring men from one discipline to another in order to promote them should be stopped.

(Para 10.11 & 10.12)

157. New, unified scales of pay are recommended. These however should be revised upwards in accordance with any changes in the general standards of salaries that may occur.

(Para 10.25)

158. When the proposed new scales of pay are brought into force there should be no restriction on drawing either the minimum of the Government of India scales of pay or exceeding the maximum in cases in which the latter is favourable to the officer.

(Para 10.10).

159. The scale of pay and emoluments of Research Assistants should be fixed in relation to the academic qualifications required for the post. In suitable disciplines Forest Rangers might be taken for these posts on deputation.

(Para 10.13)

160. The system of grouping of Branches of the F.R.I. and the Colleges into four Directorates should be abolished. Three Deputy Directors should be appointed instead.

(Para 10.14)

161. When the recruitment rules are revised, it should be ensured that for posts in certain disciplines such as Forest Entomology and Systematic Botany, Forest Officers who have the requisite scientific qualifications are eligible for appointment.

(Para 10.25)

162. The State Forest Departments should be persuaded that it is in their long-term interest that the best men with a flair for research or teaching should be allowed to go to the Institute. The F.R.I. needs the best men available if it is to fulfil its functions properly.

(Para 10.10)

163. To attract men of high calibre for work at Dehra Dun a revised staff structure, as laid out in Appendix VII is recommended.

(Para 10.26)

164. All promotions should be made by a Selection Committee on merit and not merely on seniority alone. The scheme of "merit promotions and advance increments" should be implemented expeditiously. Awards under it must be made only on the basis of recommendations of a specially constituted Committee.

(Paras 10.27 & 10.28)

165. Members of Class III and Class IV services may be given maximum opportunities for promotion within the framework of the general recruitment rules as amended. Incentives for well qualified and experienced members of the staff of the Institute may also be considered.

(Para 10.29)

166. Contacts between the Institute, the Botanical Survey of India, the Zoological Survey of India, the Universities and other Research Institutions should be strengthened. Facilities should be provided at the F.R.I. for short-term assignments to Universities graduates working for higher degrees.

(Paras 10.31, 10.32
and 10.33)

167. There must be much closer personal contact between the staff of the Institute and Forest Departments, Regional Research Centres and the forest industries. This will involve more travelling by the staff of the F.R.I.

(Para 10.39)

168. In order to give the directly recruited scientific staff a working knowledge of forestry, special short-term courses should be instituted.

(Para 10.40)

APPENDIX I.

(Vide Paragraph 1.1)

CHAMPION COMMITTEE'S MAIN RECOMMENDATIONS
AND ACTION TAKEN BY GOVERNMENT THEREON

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The chief recommendations made by the Champion Committee (1956) and the action taken thereon are briefly explained below:

<u>Sl.No.</u>	<u>Recommendation</u>	<u>Action taken</u>
1(a).	The post of Director of Forest Education should be replaced by a post of Deputy President, Forest Research and Education. The Biological Sciences, Forestry Branches and Forest Education should be placed under him.	Although these recommendations had been accepted in principle by the Ministry, they were not accepted by the Special Reorganisation Unit of the Ministry of Finance. Hence the recommendations were kept pending.
1(b).	The present post of P.A. to President should be replaced by another post of Deputy President, Forest Products Research. The chemical and Mechanical Branches should be under him.	As a result of the reorganisation sanctioned in July, 1963, however, the set up of the Forest Research Institute is now as follows:- There are <u>four</u> Directors in charge of the Branches, as shown below, to assist the President, F.R.I. in his technical work:-
2.	The Deputy President should have powers to deal with much of the day-to-day administration.	1. <u>Director of Forest Education</u> The three Forest Colleges.
3.	A special pay at a flat rate should be granted to all Chief Research Officers and Senior Research Officers holding administrative charge of a Branch instead of the existing 9 special pays @ Rs. 150/-.	2. <u>Director of Forestry Research</u> Silviculture Branch including Logging. 3. <u>Director of Forest Products Research</u> Composite Wood, Timber Mechanics, Timber Engineering, Chemistry of Forest Products, Cellulose & Paper and Wood Seasoning Branches.
4.	The existing publicity & Liaison Officer should be replaced by a Public Relations Officer, who besides assisting the dissemination of research should be responsible for Education work with a view to bringing home the importance and usefulness of results of researches obtained at the Institute.	4. <u>Director of Biological Research</u> Botany, Wood Anatomy, Forest Entomology, Forest Pathology, Minor Forest Products, and Wood Preservation Branches. 5. The President, Forest Research Institute and Colleges is directly in charge of the following Central Services Branches:

Sl. No.	Recommendation	Action taken
5.	<p>The cadre of Junior Research Officers Class II should be abolished and in integrated Class I service with a proper structure on the lines of established Central Services with provision for officers passing from the Junior to the Senior scale automatically after a specified service subject to work and conduct being satisfactory should be formed.</p>	<p>(a) Administration, Accounts Stores, Estate Management, etc. (b) Aditorial Board, (c) Service Branch, (d) Statistical Branch, (e) Publicity & Liaison Branch, including Forest Utilisation Section.</p>
		<p>The posts of Chief Research Officers have been abolished and replaced by an equal number of Selection Grade posts of Senior Research Officers. The officers appointed from the grade of Senior Research Officers (Selection Grade) as Directors have been allowed a special pay of Rs. 100/- p.m. Other special pays have either been abolished or merged in the revised pay scale.</p>
6.	<p>In order to safeguard the practical forest character of the research work as well as for efficient conduct of the forestry courses the Inspector General of Forests should be given an appropriate ex-officio Secretariat status viz. that of the Additional Secretary to the Government. This would cover the situation when the President, F.R.I. is not a Forest Officer.</p>	<p>Not yet accepted.</p>
7.	<p>The existing technical sections should be reorganised and placed under the two Deputy Presidents as shown below:-</p>	
	<p>(i) <u>Deputy President, Forest Products Branch.</u></p>	
	<p>(a) <u>Chemical Branches</u> (i) Cellulose & Paper (ii) Chemistry Branches.</p>	
	<p>(b) <u>5 Mechanical Branches-namely</u> (i) Composite Wood, (ii) Wood Preservation, (iii) Wood Seasoning, (iv) Timber Mechanics,</p>	<p>In the light of this recommendation, Branches and sections were regrouped and constituted into a number of divisions. According to the reorganisation sanctioned in July, 1963, these branches have again been re-grouped into four Directorates as shown against Items No. 1-5,</p>

<u>Sl. No.</u>	<u>Recommendation</u>	<u>Action taken.</u>
(v)	Timber Engineering with timber extraction as its section.)
(2)	<u>Deputy President, Forest Research & Education.</u>)
(a)	<u>Biological Sciences Branches, namely -</u>)
(i)	Botany Branch with)
(a)	Wood Anatomy)
(b)	Mycology including systematics and Physiology and)
(c)	Genetics and its Sections.)
(ii)	Minor Forest Products)
(iii)	Entomology)
(b)	Forestry Branches viz: Silviculture including mensuration Ecology, Soils, Forest Influences and fire protection.)
(c)	Forest Education.)
8.	For achieving liaison with other research organisations and laboratories, the Inspector General of Forests should be appointed on one or more of the relevant committees of the C.S.I.R.	This has been done.
9.	The deputation terms granted to Forest Officers appointed on tenure basis should be liberalised by granting them their grade pay in the State plus a special pay not less than Rs. 250/- p.m.	Deputation terms for Forest Officers now provide for the grant of deputation allowance of 20% of grade pay upto a maximum of Rs. 300/- p.m. instead of Rs. 150/- p.m. previously allowed. But except in the cases of a few exceptions, the payment of this deputation allowance is subject to the condition that the maximum of the grade of pay is not exceeded.
10.	A dozen research scholarships of the value of Rs. 200/- p.m. for post M.Sc. students and Rs. 400/- p.m. for post D. Phil. students should be instituted as this would be cheaper and more rewarding than the appointment of regular research staff.	Accepted and implemented.

<u>Sl.No.</u>	<u>Recommendation</u>	<u>Action taken</u>
11.	The status of a field of work of a section of a Branch or an independent Branch should not be too rigid. Fields of work which meet essential needs and which require specialists to run them should not be expanded beyond the requirements of the Institute as a whole competing for staff or funds with major units such as Silviculture or Cellulose and Paper Branch.	This is covered by Items Nos. 1-5 above.
12.	Measures aiming at better integration of the Institute as a whole should be adopted. The President should make a careful study of the practices followed for this purpose in other institutions with a view to deciding what are most promising measures for the particular case of Forest Research Institute to remedy the existing situation.	Accepted and the President, Forest Research Institute requested to implement the suggestion.
13.	The President of the Institute should pay frequent visits to all Branches. This would have a great psychological effect on the Research workers who otherwise tend to think that their efforts go unnoticed.	Accepted and the President, Forest Research Institute asked to implement the suggestion.
14.	In order to afford more avenues of promotions to Class III staff, the number of selection grade posts viz., Rs. 250-500 should be increased.	This is allowed according to a fixed percentage applicable to all Central Government offices.
15.	The prefix 'Junior' should be dropped from the designation of the posts of Junior Research Officers.	Accepted and implemented.
16.	In order to help quick disposal of administrative work of the Central Office, the Superintendent should be accorded gazetted status.	A post of Assistant Registrar F.R.I. (Class II Gazetted) had been created in lieu of the post of Head Assistant.

<u>Sl.No.</u>	<u>Recommendation</u>	<u>Action taken</u>
17.	The post of Accounts Officer, need not be exclusively reserved for appointment of a deputationist from the Accounts Department. Persons otherwise qualified and experienced on the staff of the Institute should also be eligible.	The post has since been upgraded to that of an Assistant Accounts Officer which is being filled by an Officer from the Indian Audit and Accounts Department on deputation.
18.	Members of Class III and IV staff should be given maximum opportunities for promotion within the framework of the general recruitment rules, resort to outside recruitment being made only if persons with adequate qualifications and experience are not available.	Accepted. Vacancies are being filled on this basis at the F.R.I.
19.	<u>Establishment of Regional Research Centres.</u>	
19(a)	A regional Research Centre should be established in the South. As a beginning the Research Centre at Bangalore should be taken over from Mysore Government and developed as a Regional Station for research in utilisation Branches as well as for study of spike disease of sandal for utilisation in the South, in close liaison with the Indian Institute of Sciences and the Central Virus Research Laboratory at Poona.) <u>19(a) & (b)</u>) Accepted and implemented as far as practicable.
19(b)	Similarly the Forest College at Coimbatore should be developed as a base for regional research in the biological and silvicultural fields.	
19(c)	On the basis of the experience gained with these Centre, similar regional stations could be developed later in other regions such as north India, the Himalaya and the Dry West India regions.	19(c). The work regarding development of similar regional research centres in the East and the Central India has just been taken up.

<u>Sl.No.</u>	<u>Recommendation</u>	<u>Action taken</u>
20.	<u>Certain changes in various branches</u>	
	(i) <u>Timber Extraction</u>	
	A unit should be initiated as a section in the Timber Engineering Branch to make a special study of and to do extension work in the improvement of efficiency of customary tools and the simpler appliances used in timber extraction from the forests.	Accepted and implemented. A Logging Branch has since been established.
	(ii) <u>Statistics.</u>	
	Statistics Branch should be included under the Biological Sciences group.	According to the 1963 reorganisation, this Branch remains under the President.
	(iii) <u>Mycology Branch</u>	
	The mycology Branch should form a Section of the Botany Branch which should be widened in scope. If this is not possible the Mycology Branch should be redesignated as Forest Pathology Branch.	According to the reorganisation sanctioned in July, 1965, these branches have again been regrouped into four Directorates as shown against Item No. 1 above.
	(iv) <u>Forest Genetics</u>	
	A strong section should be set up in Botany Branch for carrying out research in forest genetics in cooperation with State Forest Departments.	A branch has since been set up.
	(v) <u>Forest Influences</u>	
	A new field in Silviculture Branch should be set up for dealing with Hydrological and Soil Conservation aspects and meteorological phenomena.	Accepted and implemented.
	(vi) <u>Fire Protection</u>	
	A new field in Silviculture Branch should be started on fire protection.	Accepted.
	(vii) <u>Photo Section & Library</u>	
	The Photo Section should be under the Publicity Officer. Library should be given an independent status and it should deal	The Photo Section and Library both are now under the Publicity and Liaison Officer.

<u>Sl. No.</u>	<u>Recommendation</u>	<u>Action taken.</u>
<u>21. Publications</u>		
(a)	Manuscript on specialised subjects should be scrutinised and approved without undue delay.)) Accepted and orders issued for implementation,))
(b)	Delay in publications should be reduced by increased use of the printing equipment in publicity and liaison office.))))
(c)	<u>Indian Forester</u> The present practice of senior member of the staff doing the editing work of Indian Forester should continue. In the absence of such an officer the proposed Public Relations Officer might do this.	Accepted.
(d)	Advantage should be taken of the Directorate of Publicity of the Ministry of Food and Agriculture by submission of suitable material to the Inspector General of Forests.	Accepted. This is being followed.
<u>22. Accommodation</u>		
(a)	A new centrally located and properly designed building should be built for housing the Central Library with a record room in the basement.	Construction of a building for Central Library, cycle-shed & Record Room was sanctioned but when emergency started, it was postponed.
(b)	The Indian Forest College should move out to a separate building corresponding to the new Ranger College building. As an interim measure the possibility of shifting the Central Library to one of the museum halls might be considered.	Accepted and implemented. This could not be considered.
(c)	Suitable provision should be made for residential accommodation for the trainees coming to the Institute from States, Universities and Industry.	Done.

<u>Sl.No.</u>	<u>Recommendation</u>	<u>Action taken.</u>
23.	<u>Linkage of Forest Research and Education</u>	
	(a) The Research Officer might be utilised for teaching Botany and Soil Sciences to the Forest College students. This help by research workers might be recognised by conferring a title such as Associate Professor.	Research Officers teach Botany and Soil Sciences. But no title could be conferred on them.
	(b) Members of the educational staff should be likewise made useful contributors to research work. The possibility of such cooperation should be fully examined in order to arrive at a working arrangement to all parties.	Accepted in principle but not implemented.
24.	<u>Liaison with other Organisations:</u>	
	(a) <u>With State Forest Departments</u>	
	In addition to State Forest Officers, keeping in touch with officers of the F.R.I., there should be mutual visits at suitable intervals, meetings and symposia on special subjects, periodical review of programmes of research and the like.	Accepted. Liaison meetings with State Forest Departments and other offices are now held annually.
	(b) <u>Liaison with Industry.</u>	
	At a future date a whole time officer might be appointed at the F.R.I. to collect information from Industry and pass on results of research to industry. When an officer is appointed he could be sent to U.S.A. to be trained in the technique of industrial liaison and translation of research results into industrial practice.	A Forest Utilisation Officer has been appointed for the purpose.
25.	<u>Amenities</u>	
	There are at present about 1000 employees of various ranks working at the Institute, many of whom reside outside the estate for lack of Govt. accommodation. For the benefit of the employees, generally, who may need refreshments during the day's work the Committee has recommended that proper canteen should be set up whereby wholesome food and refreshments should be available at reasonable rates.	Accepted. A Canteen is functioning.

APPENDIX II.

(Vide Paragraph 1.3)

PROGRAMME OF THE MEETINGS OF THE EXPERT COMMITTEE

MARCH, 1965

- 11th & 12th Preliminary meetings of the Committee to chalk out the programme.
- 14th to 18th Informal discussions by Prof. Laurie with the Directors, Officers and staff of the Forest Research Institute.
- 19th & 20th Informal discussions jointly by Prof. Laurie and Prof. Maheshwari with the Directors, Officers and staff of some of the Research Branches.
- 22nd- 10.00 Meeting of the Committee with the Indian Council of
A.M. Agricultural Research.
- 3.00 Meeting of the Committee with the Indian Council of
P.M. Medical Research.
- 23rd 3.00 Meeting of the Committee with the University Grants
P.M. Commission.
- 4.00 Meeting of the Committee with the Executive Council
P.M. of the F.R.I.
- 24th- 3.00 Meeting of the Committee with the representatives of
P.M. the Paper Industry.
- 25th -3.00 Meeting of the Committee with the representatives of
P.M. Plywood and Match Industries.
- 4.00 Meeting of the Committee with the Special Secretary and
P.M. Vice-President, Indian Council of Agricultural Research.
- 4.30 Meeting of the Committee with the Directorate General,
P.M. Technical Development Department.
- 29th Informal discussions jointly by Prof. Laurie, Prof. Maheshwari and Shri Hari Singh with the Directors, Officers and staff of various Research Branches, F.R.I., Dehra Dun.
- 30th March Prof. Laurie and Shri Hari Singh visited various Research
to Branches and held informal discussions with the Officers
2nd April of the Forest Research Institute, Dehra Dun.
- 3rd April Discussions by Prof. Laurie with the Officers of the
F.R.I., Dehra Dun.

- 4th April The Committee left New Delhi for visit to the Forest Research Regional Centres at Bangalore and Coimbatore.
- 5th " 8.00 Visit to Neledad Eucalyptus Plantations of Mysore
A.M. State Forest Department.
- 11.00 Visit by the Committee to various Branches of the
A.M. Forest Research Laboratory.
- 3.00 Informal discussions held by the Committee with
P.M. Shri Ramaswamy, former Director of the F.R.L., Bangalore.
- 4.00 Discussions with the Head of the F.R.L., Bangalore.
P.M.
- 5.00 Discussions with the Chief Conservator of Forests, Mysore.
P.M.
- 6th " 9.30 Visit of the Committee to the Plywood Research Station and
A.M. later informal discussions with its Director at Bangalore.
- 3.00 The Committee left Bangalore for Coimbatore.
P.M.
- 6.00 Visit by the Committee to various Research Branches
P.M. and the Museum at the Southern Forest Research Centre,
Coimbatore.
- 7th " 9.00 Discussion with the Principal, Officers and staff
A.M. of the Southern Forest Rangers College, Coimbatore.
- 8th & 9th " Visit by Prof. Laurie, Prof. Maheshwari and Shri Hari Singh
to the Soil Conservation Centre, Botanical Gardens, Wattle
and Eucalyptus Plantations etc. in the suburbs of
Ootacamund, Mysore and Bangalore.
- 12th " 11.30 Informal meeting at New Delhi of the Committee with
A.M. the Advisory Board of Research of the F.R.I.
- 2.30 Meeting of the Expert Committee with the Court of
P.M. the F.R.I. & Colleges.
- 4.00 Meeting of the Committee with the Chief Conservators
P.M. of Forests.
- 10.00 Chairman and Members of the Committee except
P.M. Prof. Maheshwari who left on 13th night, left New Delhi
for Dehra Dun.

13th April 10.00 Meeting of the Committee.
A.M.

3.00 Meeting of the Committee with the Directors and
P.M. Class I Officers at the F.R.I. Board Room.

4.30 Meeting of the Committee with the Directors
P.M. individually.

14th " 9.30 Visit by the Committee to various Research
A.M. Branches in the F.R.I., Dehra Dun.

11.30 Meeting with the Class II Officers in the F.R.I.
A.M. Board Room.

12.30 With Class II Officers individually.
P.M.

3.00-5.30) Meetings of the Committee.
P.M.)
7.15)
P.M.)
8.30)
P.M.)

15th " 8.45) Visit to the remaining research Branches of the
to) F.R.I. and Colleges.
10.30)
A.M.)
10.30)
A.M.)
to 1.30) Meeting of the Committee.
P.M.)

3.00) Meeting of the Committee with the President, F.R.I.
to) and Colleges, Dehra Dun.
5.00)
P.M.)
5.00) The Committee had informal discussions with Shri M.D.
to) Chaturvedi, former I.G.F., S/Shri K.L. Agarwal and
7.00) M.A. Rehman, former Presidents and S/Shri K.D. Bagchi,
P.M.) R.N. Mathur and M.B. Raizada, former officers in the
F.R.I. and Colleges, Dehra Dun.

16th & 17th " Meeting of the Committee.

19th April Chairman with all Members of the Committee
returned to Delhi.

19th " Meeting of the Committee.

20th " Prof. Laurie proceeded back to Oxford.

APPENDIX III.

(Vide Paragraph 1.4)

LIST OF INDUSTRIAL AND OTHER ORGANISATIONS ADDRESSED AND THE QUESTIONNAIRE ISSUED TO THEM.

1. The Secretary, All India Plywood Association, 11, Mission Road, Calcutta.
2. The Secretary, Southern India Plywood Association, Calicut, (Malaba) Kerala.
3. The Secretary, Joint Committee of Paper Industry, India Exchange, Calcutta.
4. The Secretary, Federation of Indian Chamber of Commerce & Industry, Federation House, New Delhi-1.
5. The Secretary, Indian Paper Makers Association, Royal Exchange, Calcutta.
6. The Secretary, Associated Chamber of Commerce of India, Royal Exchange Calcutta.
7. The Secretary, Western India Match Co., Indian Merchantile Chamber, Nicol Road, Ballard Estate, P.O. Box No. 254, Bombay.
8. Members of the Advisory Board of Research of the Forest Research Institute representing Plywood, Paper, Match and other industries, viz.
 - (a) Shri A.K. Kaderkutty, Managing Director, M/s. Western India Plywood Ltd., Balia Patam, Kerala State.
 - (b) Shri P.S. Kothari, Managing Director, Nepa Mills, Nepa Nagar, Madhya Pradesh.
 - (c) Shri M.L. Zutshi c/o M/s. Karam Chand Thapar & Bros. (P) Ltd. Thapar House, 25, Brabourne Road, Calcutta-1.
 - (d) Mr. M. Jan Olof Guthe, Technical Manager, M/s. Western India Match Co., India Merchantile Chambers, Nicol Road, Ballard Estate, P.O. Box No. 254, Bombay.
 - (e) Shri K.S. Lauly, M/s. Indian Plywood Manufacturing Co. Ltd., Dandeli, Mysore.
9. Plywood Manufacturers Association of West Bengal, 22, Strand Road, (1st Floor) Calcutta-1.

OTHER ORGANISATIONS

1. The Ministry of Railways (Railway Board), New Delhi.
2. Industrial Adviser, Ministry of Industry.
3. Department of Technical Development,
4. All Chief Conservators of Forests.

QUESTIONNAIRES.

Questionnaires issued separately to:

- (i) Railways;
- (ii) Industries; and
- (iii) Chief Conservators of Forests,

for furnishing information regarding work at the Forest Research Institute and Colleges, Dehra Dun, were as below:-

To Railways.

- (i) In how many and what ways are the Railways connected with the functioning of the Forest Research Institute and Colleges?
- (ii) Has the Forest Research Institute of Dehra Dun been of assistance to Railways in the near past in the matter of timber or wood products utilization? If so, give particulars of assistance derived in the past 5 years.
- (iii) Are there any problems before the Railways in which the Forest Research Institute & Colleges could give assistance in near future? If so, give particulars.
- (iv) Are you satisfied with the Courses of training which are being specially arranged by the Forest Research Institute for Railway personnel in respect of use of timber? What are your suggestions for improvement in the conductance of such courses?
- (v) What are your further suggestions regarding the ways and means by which Forest Research Institute can be of help to the Indian Railways?

To Industries:

- (i) What is the nature of your industry and the forest produce that you are interested in?
- (ii) Give particulars of the forest region and agencies from which you normally obtain your requirements of forest produce, as also the form in which that produce becomes available to you.
- (iii) In the utilisation of the produce have you had occasion to avail your self of any information furnished by the Forest Institute? If so, give reference and/or particulars.
- (iv) Has the Forest Research Institute been of assistance in meeting the requirements of the development of your industry? If so, give particulars of assistance derived.

- (v) Are there any improvements which you think could be investigated by the Forest Research Institute? If so, give your suggestions.
- (vi) Give any further suggestions you may have for work at the Forest Research Institute being correlated to the requirements of your Industry and how the results of its work can be made readily available to you.
- (vii) Are there any patents taken out by the Forest Research Institute and Colleges in the exploitation of which your industry is interested; If so what?
- (viii) If the answer to (vii) is in the negative, what are the reasons?

To all Chief Conservator of Forests:

- (1) Kindly furnish particulars of any assistance sought by your State from the Forest Research Institute (say) in the last 3 years.
- (2) Has this assistance been rendered?
 - (a) finally, or (b) are investigations in progress on the subject.
- (3) Have there been any instances of your requirements not receiving attention in time?
- (4) Have you any suggestions for the improvement of coordination between requirements of the State and the investigation undertaken by the Forest Research Institute, Dehra Dun.
- (5) Have you any suggestions for improved work on Forest Research in respect of:-
 - (a) Silviculture,
 - (b) Forest Botany,
 - (c) Forest Protection,
 - (d) Forest Utilisation.
- (6) Have you any further suggestion to make for improvement in the organisation of forest research in India in the interests of development of scientific forestry and Forest Utilisation in the State?
- (7) Have you got any other specific suggestion to make on the terms of reference of the Expert Committee?

APPENDIX IV.

(Vide Paragraph 1.7 and 2.14).

CONSTITUTION AND FUNCTIONS OF THE ADVISORY BOARD OF RESEARCH FOR THE FOREST RESEARCH INSTITUTE & COLLEGES CONTAINED IN THE GOVERNMENT OF INDIA, MINISTRY OF FOOD & AGRICULTURE (DEPARTMENT OF AGRICULTURE) RESOLUTION No. 14-1/62-F, DATED THE 9TH JULY, 1963.

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CONSTITUTION OF THE BOARD

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, a Central Advisory Board of Forest Utilisation was set up in 1939. The Board was re-constituted twice subsequently in order to ensure greater association of non-officials and to give further weightage to opinions and representing the interests of industry, agriculture and consumer.

2. As a result of the constitution of the Court of the Forest Research Institute and Colleges in November, 1961, with responsibility for laying down the policy and programme of the Institute and for guiding and directing its working, it became necessary to review the composition and directing its functions of the Central Advisory Board on Forest Utilisation with a view to avoiding possible over-lapping of the functions of these two bodies. As a result of such a review, it was decided that the Central Advisory Board on Forest Utilisation here-named as "Advisory Board of Research" would have the following composition and functions:-

Composition:

Vice-Chairman of the Court of the F.R.I. and Colleges - Chairman

Members:

Joint Secretary in-charge of Forestry in the Ministry of Food & Agriculture (Department of Agriculture)

Inspector General of Forests.

Director General, Council of Scientific & Industrial Research.

President, Forest Research Institute & Colleges.

One representative each of:

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

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

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

The Secretary of the Court of the F.R.I. & Colleges shall be Secretary of the Advisory Board.

Functions:

The Functions of the Advisory Board shall be:

(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 F.R.I. & 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 F.R.I. and other cognate matters and to evaluate annually the progress of research;
 - (e) to examine inventions and discoveries in the field of forestry 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 F.R.I. 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.
3. The term of members other than ex-officio members shall be three years provided that a non-official member shall cease to be such if he ceases to be a member of the body which he represents. All vacancies among members other than ex-officio members shall be filled by the authority which nominated them. A person nominated to a casual vacancy shall continue to be a member of the Board for the remaining period of the term for which the person whose place he fills would have been a member.
4. One-third of the total number of members shall constitute the quorum for a meeting.
5. The Board shall meet at least once a year.

APPENDIX V.

(Vide Paragraphs 1,7 and 2.13).

CONSTITUTION AND FUNCTIONS OF THE COURT AND THE EXECUTIVE COUNCIL FOR THE FOREST RESEARCH INSTITUTE AND COLLEGES AS CONTAINED IN THE GOVT. OF INDIA, MINISTRY OF FOOD & AGRICULTURE (DEPARTMENT OF AGRICULTURE) RESOLUTION NO. 12-4/59-F, DATED 4TH NOVEMBER, 1961.

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CONSTITUTION OF THE COURT

In order to effect improvements in the working of the Forest Research Institute and Colleges, Dehradun, 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, it was felt that these 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 was concerned, the Court would be assisted by an official Executive Council consisting of members who were members of the Court. While the Court would lay down the policy and programme of the Institute and give general directions and guidance for its working, the Executive Council would be directly responsible for the administration of the Institute so as to ensure its efficient working. It was accordingly decided 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.

The Minister for Food and Agriculture	- Chairman
The Minister for Agriculture	- Pro-Chairman
The Secretary, Ministry of Food & 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,
Incharge 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 Advisor, 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 and the Executive Council.

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

3. 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 Promotion Committee.

4. The Executive Council may, by resolution (vide annexure), 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 powers 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 meeting 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 members 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 dissenting members shall be brought to his notice, if the member 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 & 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 the 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.

ANNEXURE TO APPENDIX V.

Rules of procedure for the Executive Council regarding disposal of day-to-day administrative matters of the Forest Research Institute & Colleges; as contained in the Government of India, Ministry of Food & Agriculture (Department of Agriculture), Resolution No. F.15-12/62-F, dated the 27th May, 1963.

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The Executive Council of the Court of the Forest Research Institute and Colleges in its meeting held on 4th April, 1963, adopted the following Resolution in respect of the disposal of the Administrative and other matters relating to the Forest Research Institute:-

"Resolved that the Chairman of the Executive Council be delegated powers to dispose of administrative and financial matters specified in the attached list subject to the condition that the action taken by the Chairman under this Resolution shall be reported for confirmation at the next meeting of the Executive Council".

2. In pursuance of the above resolution, the Chairman of the Executive Council (i.e., Secretary) has decided that he would exercise the powers delegated by the above resolution in respect of the following matters:-

- (i) Creation of post within the powers of the President, Forest Research Institute; continuance of temporary posts, conversion of temporary posts into permanent ones.
- (ii) Recruitment rules; appointment to scientific gazetted posts including ad hoc appointments; grant of extension of service; refusal of leave; deputation on foreign service; fixation of pay and all other connected matters outside the powers delegated to the President, Forest Research Institute.
- (iii) Appointment of State Forest Officers on deputation at the Forest Research Institute and connected matters.
- (iv) Appeals and memorials; disciplinary matters; Vigilance questions.
- (v) Research and Development Schemes of the Forest Research Institute.

3. The Chairman of the Executive Council has delegated his powers to the Joint Secretary in-charge of Forests in the Department of Agriculture in respect of the following items relating to the Forest Research Institute and Colleges:-

- (i) Budget estimates of the Forest Research Institute and its subordinate formations.
- (ii) Audit reports; inspection reports; audit objections and appropriation accounts.
- (iii) Administrative approval for construction of buildings by C.P.W.D. and departmentally - Land, Lease, acquisition and connected matters.
- (iv) Administrative matters relating to non-gazetted establishment such as recruitment rules; appointment in relaxation of normal rules; fixation of pay scales, pay, seniority etc; grant of ex-gratia payments, etc.
- (v) Forest education - Rules for the Diploma and Rangers Courses; allotment of seats in the colleges; diploma courses in paper and pulp technology, seasoning and preservation, etc.
- (vi) Rules for the allotment of residential accommodation at the Forest Estate; fixation and recovery of rent in special cases.
- vii) Sanction for purchase of stores and equipment beyond the financial powers of the President Foreign Exchange.
- (viii) Delegation of powers to the President, Forest Research Institute and his subordinate officers.
- (ix) Grants-in-aid to the service associations, New Forest School etc., recognition of service associations.
- (x) Matters relating to patents taken out by the Forest Research Institute.
- (xi) Labour Laws - their application to the Forest Research Institute.
- (xii) Assistance under the Foreign aid programmes including training and deputation.

APPENDIX III.

A NOTE ON PLAN SCHEMES OF FOREST RESEARCH INSTITUTE
AND COLLEGES.

THE FIRST FIVE YEAR PLAN

During the First Plan period very few research projects were undertaken for implementation under plan schemes. However, realising the need for forestry trained personnel that would arise for implementing the future forest development programmes, additional accommodation and equipment were provided in the First Plan for education and training.

THE SECOND FIVE YEAR PLAN

In the Second Plan, research activities of almost all the branches were expanded. The Timber Engineering Branch was reorganised with a view to undertake and demonstrate the new designs and techniques in timber utilisation. The Minor Forest Products Branch carried out experiments to introduce the Malayan cane, in addition to studies on the cultivation and exploitation of the indigenous species of cane. It also established a demonstration-research farm for Rauwolfia serpentina with a view to provide technical advice on its propagation etc., and to supply seeds for helping establishment of commercial farms not only by the State Forest Departments but also by the individuals. A scheme to test the durability of treated and untreated timber was launched. Similarly, preservative treatment tests were carried out successfully on bamboos with a view to make it last longer as a poor man's timber. In sea-water structures, timber was gaining special importance because of its light weight resistance to erosion and non-magnetic properties, but its main defect was the low resistance to marine organisms, with a view to find control measures, was initiated in the harbour research centres at Bombay, Cochin, Trivandrum, Madras and Waltair. Under the Plan Introduction Scheme about 120 valuable exotic timber species were introduced as a trial in appropriate climates. Forest genetics - a new section - was added to the Botany Branch. Studies on epidemiology of Forest insect pests were started. In the Silviculture Branch, new fields of studies were introduced under the schemes "Forest Influences", "Ecology of Indian Forests", and "Establishment of Logging Branch". In the field of publicity, posters and pamphlets depicting products and processes evolved at the Institute were prepared and published. In addition, sets of exhibits of F.R.I. products and processes were supplied to 16 Universities. To cope up with the printing work in

connection with the F.R.I. publications, form etc., a power driven printing press was installed. Reorganisation of Central Library was also taken in hand. A designing and fabrication section was added to the Service Branch. "Editorial Board" was started to revise old editions of some important forestry books. During this Plan period a regional research centre was also established, with Silviculture and Biological Research at Coimbatore and utilisation research at Bangalore after taking over the Forest Research Laboratory at Bangalore from the Government of Mysore. The total outlay for the Second Plan was for Rs. 80.00 lakhs out of which only Rs. 32.28 lakhs could be spent; but this amount did not include the capital expenditure incurred by the Ministry of Works, Housing and Supply, for the regional centre at Bangalore and for designing and fabrication Section at the F.R.I.

THE THIRD FIVE YEAR PLAN

For the Third Plan originally a sum of Rs. 155 lakhs was provided for the research and training schemes but these were cut down later due to emergency and finally schemes for Rs. 37.08 lakhs were sanctioned. As against this, due to late sanction of the schemes, delay and difficulties in the recruitment of staff and procurement of equipment, an actual expenditure of Rs. 20.00 lakhs only is anticipated. The important works taken up during this period are summarised in the following paragraphs.

The Silviculture Branch collected resin yield data under different conditions, prepared volumes tables for 9 species and completed considerable arrear documentation and ledger work. The work on percolation and dew studies inside forest plantations was also initiated. Studies have also been made on seed testing and certification and on forest soils, particularly relating to the important species like sal, teak, Eucalypts and Casuarina.

In the field of Biological Research, seed orchards of teak were established and grafting techniques were standardised for senal and chir pine. As regards preservation treatment of green bamboos, detailed anatomy of 11 species of bamboos was studied and a simple method for treating green bamboos by soaking them in the preservative solution was developed. Several types of low cost structures, using treated bamboos for reinforcing mud also cement concrete roofs and walls were installed and a comprehensive publication on the same issued. Preliminary investigations were also carried out for protection of indigenous timber in Cooling Towers with a view to stop imported timber which has hitherto been used.

In the field of Forest Products Utilisation particularly relating to Timber Engineer filed, some designs of timber joints have been tested and much of this information has been published; arrangements for proof testing of trusses have been completed; work on the preparation of a handbook was taken up. In connection with the work on the utilisation of timber and grasses found in North East region of India (particularly from Nagaland) for tea chests and other packing material. "Magle" reeds were received. Preliminary experiments for making hardboards are in progress.

Under the Forest Education, the training capacities of the Indian Forest College and Northern and Southern Forest Rangers Colleges have been increased almost to twice that of the pre-Plan period. The new building for the Indian Forest College was completed. Sports and physical training facilities for students were expanded, construction of semi-permanent sheds at important camping areas during practical training in forests has been taken up. For publicity purposes a forest information centre has started functioning.

THE FOURTH FIVE YEAR PLAN

A sum of Rs. 250 lakhs has been tentatively provided for the schemes to be implemented by this Institute during the Fourth Five Year Plan period. Out of this, research schemes amounting to Rs. 150 lakhs (including the proposed regional centres to be established at Jabalpur and Gauhati) and training schemes for Rs. 100 lakhs are being prepared. According to the demands of the States, about 800 officers and 2500 Rangers are required to be trained during the Fourth Plan period, which means an annual intake of about 160 officers and 500 Rangers. The existing training capacity in the colleges is far too short to cope with this increased intake.

For the successful implementation of the schemes it is necessary that quick decisions are taken to sanction the schemes, to provide funds including foreign exchange, to recruit suitable staff, to procure stores and equipments, to construct requisite buildings etc.

APPENDIX IX.

(Vide para 4.86 (iv)).

NOTE ON DISPOSAL OF EFFLUENT FROM THE PROPOSED
EXPANSION OF PAPER PLANT AT THE FOREST RESEARCH
INSTITUTE, DEHRA DUN, BY DR. T.R. BHASKARAN,
COORDINATING OFFICER, P.H. ENGINEERING RESEARCH
UNIT, ALL INDIA INSTITUTE OF HYGIENE & PUBLIC
HEALTH, CALCUTTA.

The proposal for expansion of the existing plant envisages continuous operation of the plant on a 24 hour basis for the production of 6 tons of paper per day by (a) using wood or bamboo as raw material, and (b) using pulp and paper cuttings as raw material.

If the process (a) is adopted, the anticipated quantity of effluents to be disposed of from the plant will be about 6 lakhs gallons per day including black liquor obtained from the digestors. Disposal of black liquor along with the effluent as at present practised in the existing plant is not possible for this quantity of effluent in this region. If the scheme (a) is to be adopted, it is necessary to segregate the black liquor before dilution for its concentration and burning for recovery of chemicals. As indicated earlier, this however, is not possible with the existing design of the digestors. Under the circumstances, it would appear that expansion of the existing plant using bamboo and wood as raw material would pose every serious problems in regard to disposal of effluents produced by the plant for which there is no easy solution.

If the plant is run according to the scheme (b) using pulp and waste paper, the effluent disposal problem may not be serious and can be tackled satisfactorily. The quantities of effluent that are likely to arise in adoption of this process will be about 2 lakh gallons per day. Black liquor will not be present in the effluent and B.O.D. will also be much less than in scheme (a). It may also be possible to dispose at least a major part of this effluent on land through irrigation. The feasibility of such disposal and utilisation of the effluent as irrigation water for forest crops in the nurseries of the F.R.I. and agricultural crops within the estate and adjoining villages should be investigated. This method of disposal may be tried out on experimental basis in few plots in the nursery for forest crops as well as agricultural crops by using the effluent obtained from the existing plant. If the experiment proves successful and sufficient land is available for bringing under spray irrigation in the areas, the excess effluent likely

/contains
organic
materials
which are

to arise from expansion of the plant using scheme (b) can be satisfactory disposed in this manner. This procedure will not only take care of the effluents produced in the factory but also lead to gains through better crop growth, since the effluent is useful as soil conditioner. From the point of view of the disposal of the effluent, it would appear that adoption of scheme (b) is better suited to the region than scheme (a).

In conclusion it may be observed that

(i) The present arrangement for disposal of effluent with the diversion of the drain passing through the Golf ground and proper maintenance of the drainage channels including the nullahs is satisfactory for the disposal of the effluents from the existing plant.

(ii) From the point of view of satisfactory disposal of effluents, the expansion scheme using ready-made pulp and paper cuttings as raw material is recommended.

(iii) Investigation should be undertaken immediately to explore the possibility of using the waste water of the pulp washing and paper machines of the existing plant as irrigation water for forest and agricultural crops in the area so that this method of disposal of effluent can be ultimately adopted for the disposal of the effluents that are likely to arise from the expansion scheme as recommended under (ii).

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#D.P. VERMA#
20-5-1967