

# Review

## **50 Years of Forestry Research.** Forestry Commission Bulletin No 50 (HMSO £1.75).

This bulletin is a review of research work conducted and supported by the Forestry Commission between 1920 and 1970 although the contents separate the 1920 to 1945 period from the remainder.

In his introduction the author refers to the Forestry Act of 1919 marking the beginning of organised forest research in Great Britain. He refers to the considerable volume already written about research topics and he has been guided in selecting and summarising to bring out the main streams and to give as much attention as possible to contemporary thinking and research approach. This then should be a useful bulletin to guide others in their approach to research and to provide the non-research worker with an understanding of the benefits, limitations and probable future course of research.

From the beginning the Commission organised its own research branch to deal with the problems of the growing crop. It felt that other subjects in connection with forestry problems should be referred to the appropriate authority, while the Forest Products Research Laboratory was set up under the Department of Industrial and Scientific Research in 1927 to deal with forest products research. The latter of course also dealt with colonial timbers. The function of the Commission's own research branch was to carry out experiments designed to improve techniques in all branches of practical forestry work, to study the factors of production and to hold a watching brief for new diseases and pests as well as discovering methods of controlling existing disorders. Fundamental research proved a difficult field for the Commission before the Second World War because, although they had the authority to support such research financially if it was likely to yield a direct benefit to forestry, there was no specific Research Council, although the Agricultural Research Council which was set up in 1931 did do a certain amount of work on forest soils and tree nutrition.

The main problems seen in the initial stages were how to apply existing knowledge to the large scale plantings which were then introduced. By and large afforestation objectives were to find the cheapest effective method of establishing a healthy crop rather than to maximise the profitability of the undertaking. Although he refers to the value of R. A. Fisher's work at Rothamsted being recognised at an early stage by the Forestry Commission, the author unfortunately considered that the development of research methods and experimental techniques was not a subject for this particular bulletin. A

weakness which he has identified has been that in spite of excellent leadership and communications, progress was delayed because of a lack of development work such as widespread field trials following quickly on indications of promising experimental results.

Then follows a series of chapters dealing with research in the pre-war period under the headings of Nurseries, Establishment, General Silviculture, Species and Provenance, Mensuration, and Protection. These give little information of value in determining how beneficial the research effort has been although they give a few insights into certain basic problems such as restricting nursery research to a special research nursery, with its advantages of better control and experienced experimental staff, but lacking contact with the executive and thereby leaving many field practitioners to discount the results as not applicable to large scale conditions. On this one unfortunately no answer is given on what would appear in retrospect to be the best approach. A rather useful insight is that certain experiments on pruning were few and far between but the field work was valuable in terms of analysis at a much later date.

The chapter dealing with post-war policy indicates that the earlier approach was to be continued with the Commission doing all strictly applied work, and supporting basic work having some bearing on applied forest problems, but not supporting basic work in the forest sciences not related to any specific problem. This latter aspect of research was only covered by the setting up in 1965 of the Natural Environment Research Council which has a Forestry and Woodland Research Committee although of course other committees of it are of interest to foresters such as those on Ecology and Hydrology. A further major policy change introduced post-war was to set up a specific research station with its own Pathology, Entomology and Seed Testing Sections and housing the mensuration specialists while retaining separate silvicultural research in Scotland and England and Wales. The author points out a major difficulty here with his reference to a hint of the confusion of ends and means which has so often bedevilled discussions on kinds of research: sophisticated methods appearing more appropriate to fundamental than to applied research. The American Earl Stone once remarked that you could do pure research with a bulldozer and applied research with a microscope. Unfortunately there is again no comment as to how in that respect a clearer sub-division could have been made or indeed if it was desirable to make such a distinction.

The chapter dealing with organisation and development of research is of interest to show the relative importance attached to different aspects. Thus, apart from the post-war creation of new Departments of Pathology and Entomology as mentioned above, the first new

section was Genetics. It is interesting that there was some opposition to this on the ground that more was to be gained by attention to seed supply at the species and provenance level but the comment is made by the author that organisation of seed supply remained weak over much of the post-war period resulting in the loss of a good deal of productive capacity. There is an apparent inference from this that the Commission would have been better to have concentrated more on seed and provenance and less on genetics in the 1950s. A separate Soils Section was established in 1963 and an Ecological Section in 1964 while in the early post-war period the Scottish silviculturalist was given responsibility for North England thereby giving him the bulk of the work on upland afforestation. During the post-war period the Mensuration Section evolved beyond recognition and one of its sub-sections, Statistics, was expanded into a separate research section; further additions were working plans plans and a new section on Forest Economics. However in 1960 management left research to become a Headquarters function and in 1966 management, work study and machinery research was incorporated in Headquarters Management Services Division. In the whole of the post-war period there was also some addition at Headquarters of specialist sections which were concerned in part at least with research such as machinery development, first introduced in 1949, utilisation in 1950 and work study in 1954.

Reference is also made in this chapter to the disadvantages of Alice Holt as a central research station. Apart from the fact that it was considered remote from Scotland where much of the effort was required there was an obvious change in approach with silvicultural research calling for some laboratory facilities and then for more laboratory staff etc., and ultimately this led in 1970 to the opening of the Bush Research Centre near Edinburgh. Reference is made in the bulletin to its favourable situation close to other research organisations such as those dealing with hill farming, plant breeding and the University Department of Forestry and Natural Resources. Although the Commission had earlier decided against too close a link between its own research work and that of any other institutes including those dealing with fundamental aspects there is no comment by the author as to how far this move has been a good or a bad thing. He does however indicate that the next decade will see a process of adjustment between the Commission and the Natural Environment Research Council, and in many ways it is regretted that a research council concerned with forest science arrived on the scene so late in the day. Is Wood saying that it would have been better all along to have had such close links with another basic research institute? Indeed the whole question appears to be one which the Forestry

Commission has found almost impossible to solve, especially as one notes that they set up their own section dealing with tree physiology based in Edinburgh rather than let this be handled within the general confines of the Natural Environment Research Council.

Wood comments that the research programme has largely been initiated by research. It has been the main item for discussion at an Annual Research Conference and has been presented to the Research Advisory Committee for general comment. This Advisory Committee is a small Committee with close ties to the Imperial (now Commonwealth) Forestry Institute in Oxford, Kew, Rothamsted, Macauley Institute, Forests Products Research Laboratory, and a Professor of one of the other Forestry schools. Wood suggests that this has been a useful committee but it appears that his thinking has been influenced by members' help in various aspects in which members of the Advisory Committee were themselves specialists. In this general context it is of interest that the original discussions were obviously based on detailed lists of work to be done but that this has now changed to summaries setting out directions of work under major project headings as far as possible. In this way it is obviously easier to control the whole body of research and link various disciplines one with another.

Although Wood once more commends the research station for its use of statistical techniques for design and analysis of experiments and surveys and for its lead in computerisation and that this has proved its value in eliminating errors, areas of boredom etc. and enabled the computation of complex calculations, he does suggest that in a research establishment Parkinson's law operates very much as far as computers are concerned. He is not prepared unfortunately to comment on whether an establishment is better to own its own computer or have access to larger central installations.

A general comment is given in the chapter on organisation and development that in the post-war period much more financial support was given to grant-aiding and co-operation in research. Various types of arrangements from specific aid for individual projects to paying for staff stationed at other institutes etc. have been tried and in the absence of other comment one must assume that they have all been equally effective. There has of course been an end to the Commission grant-aiding items which are not of direct application, which were considered to be completely the responsibility of NERC once it was set up. The only other general reference to the cost of research over this 50 year period is in the very first chapter on pre-war policy when it is stated that the annual total expenditure increased from £6,900 per annum to £18,000 pre-war (this figure included grants to institutions), and that by 1969 research expenditure was £873,000.

Unfortunately it is not clear if the latter is only direct Forestry Commission research or whether it includes grants to other institutes for work related to immediate problems or work related to non-specific problems.

Forestry Commission work on tree seed was largely to improve laboratory testing methods on germination etc. and the comment is made that it had a large share in the economics in seed purchase which became increasingly apparent in the 60s.

The main interest in the chapter on nursery nutrition is that although this topic was obviously closely related to day to day operations research was passed to a sub-committee of the Research Advisory Committee and much of the work was done by a straight financial grant to Rothamstead. The comment is made that research failed to show advantages for rotations, fallow crops, cover crops etc. but in general this section shows the value of new thought in solving intractable problems. Although seed bed weeding costs came down by 80% it has been difficult to put a value on the work on herbicides. Again the techniques of using tubed seedlings or the "Finnish Roll" are not evaluated. Reference is made to the study of minor species on some 500 scattered sites using production profitability as a criterion. Direct species research work and trials have however largely been concentrated on poplar and elm "because of their importance" outside Forestry Commission operations and because of Peace's interest in the importance of specific diseases. Reference is made to the importance of exposure in limiting afforestation.

The nutrition of forest crops has been looked at largely in England or in a specialised manner on the Culbin sands in Scotland. The mobilisation of nitrogen in forest soils remains one of the great problems of cool temperate regions but the comment is made that it is probable we have approached the limits of what can be done by manuring in the establishment of the crop. Reference is made to the virtual total use of laboratory analysis to help in assessing projects for refertilisation of pole stage crops but does this not leave the impression that the art is sufficiently sophisticated for all situations?—hardly the case in many of the situations one finds in the field.

The chapter on cultivation and drainage research shows the concentration on heath type sites and interestingly comments that treatments regarded as uneconomic when the experiments started now show valuable results, and the question of evaluation of these has to be reopened. The truism is made that "the evaluation of drainage effects is likely to prove a complicated business" but no hint is given of how it might be attempted.

Although regeneration and rehabilitation are going to become more

and more important items in the future research has been rather limited.

Further developments in the field of weed control are expected. The earlier work on pruning has raised questions of the effect on increment and dominance but no answers or opinions on these effects are given.

Work on composition and stability is recorded as possibly suffering from a lack of definition between the job of the mensuration and the silvicultural specialists but no conclusions can be reached as yet on mixtures, irregular crops etc. being any more stable than others. The need to look at under-planting for change of species is mentioned.

The section on provenance and breeding gives some interesting comment on all the main species and on the problems associated with vegetative reproduction. Of particular interest is the statement that it will be a slow process to improve Sitka spruce by conventional breeding methods and the difficulty of linking characteristics such as density with trees identified visually as plus trees is touched in passing.

The brief history of soils research is illuminating in that although help was given to many outside organisations with international reputations such as Oxford University, Macauley, Rothamstead, Nature Conservancy, and Edinburgh University the Commission opened its own soils laboratory in 1955 enabling analytical and instrumental studies of soils to be made. The basic reasons for this change are not given at all. Although earlier worries about the problems of mor formation have largely disappeared the bulletin is refreshingly frank about the lack of benefit to date from the biological as opposed to the nutritional approach, while recognising that large stores of unavailable nitrogen posed problems for the future. The comment that uneven distribution of nutrients in the profile is a problem is hardly justified by itself.

The chapter on protection laments the limitation of research effort on pests and diseases but then proceeds to give an excellent summary of the control operations which have been developed and put into effect in the past 50 years. Many of these have of course broken completely new ground such as the use of *Peniophora* for *Fomes* control and the virus suspension for *Neodiprion* control. The *Fomes* story indeed highlights the value of objective basic research which, because the method of infection had been identified, enabled a quick solution to be found when the economic problem arose. The summary also gives useful comment on the likelihood of certain insect and other pests becoming a major problem or where natural population collapse seems to be a general feature.

Chapters are included on mensuration, management, economics,

operational research, development and publications because they were at one time or another part of the Research Branch. These give a good summarised history of the evolution of these topics in the organisation of the Forestry Commission but still leave "as a matter for convenience" the question as to how far they should be associated with management or with research. A valuable point is however made that it may be useful to bring in operational research techniques at the outset. Many workers finding difficulty getting through the mass of paper will welcome the suggestion that documentation may have been over-emphasised and that in future there should be a concentration on document keys.

It will be seen from the above that the contents are very patchy in relation to indicating contemporary thinking on the many different problems which will arise for forest research. Even though the author in his concluding remarks says "any attempt at a general evaluation would be over ambitious" it is unfortunate that references to the cost of the research programme are generally lacking. The bulletin is very sketchy on the research approach and the author has often been content merely to list problem questions. There are great difficulties for those concerned with the organisation of all Forest Services in determining who should do research, how much should be spent on it, priorities of work etc. These are also of interest to all practicing foresters who want to be sure that they are backed up by good cost-effective research with quick and easy access to up-to-date results. With the forward looking approach of the Forestry Commission on so many fronts what a pity that the opportunity was not grasped on this occasion to give more answers, however personal and tentative, rather than restate the problems. Perhaps your reviewer was expecting too much but he is certainly left with the impression of a handsomely and expensively produced document eminently readable but adding little to the solving of the basic research programme problems. Society members will however find it interesting reading.

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