

IRISH FORESTRY

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JOURNAL OF THE SOCIETY OF IRISH FORESTERS

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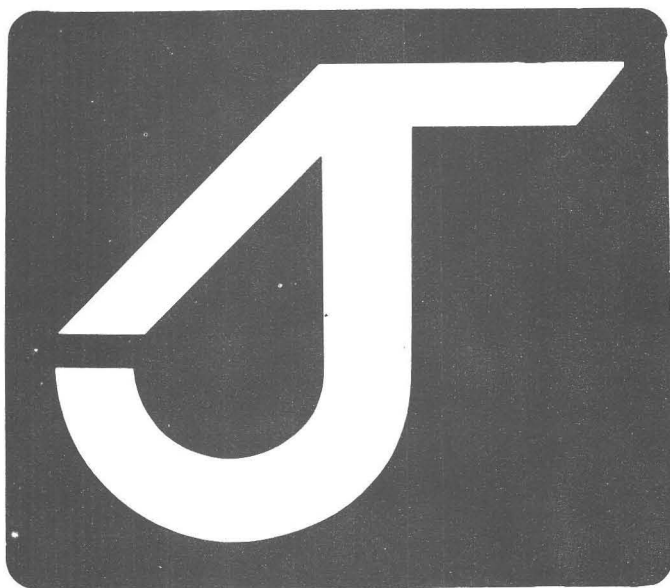
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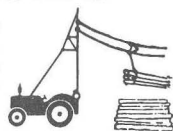


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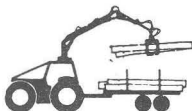


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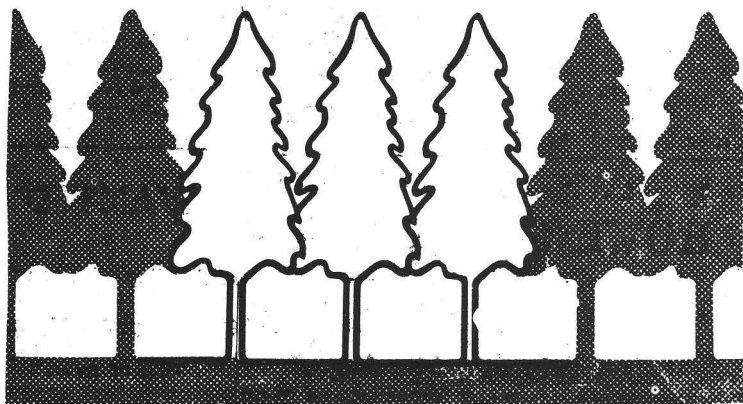
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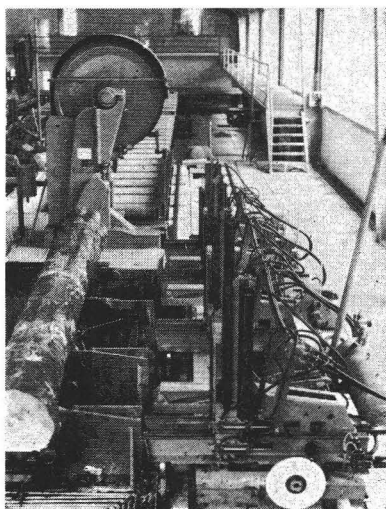
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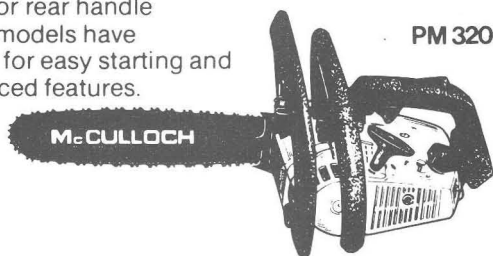
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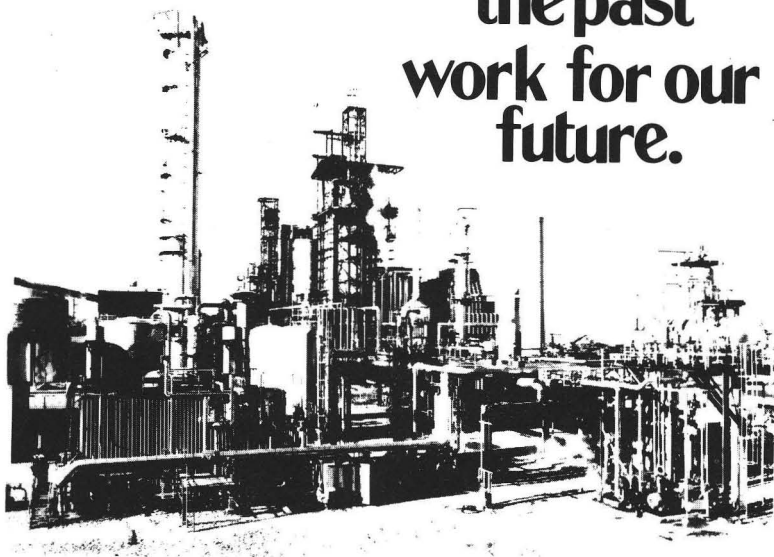
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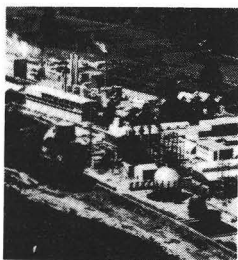
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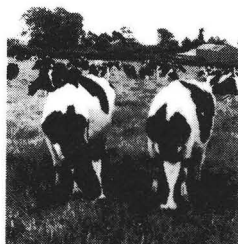
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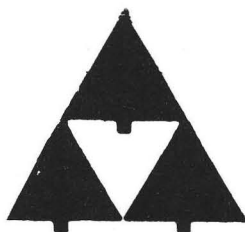
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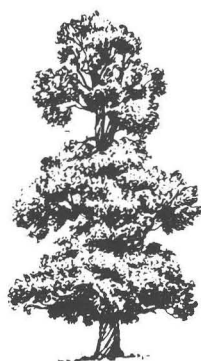
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1. Two copies of each paper should be submitted, in typescript, with double spacing and wide margins.
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Note: The opinions expressed in the articles belong to the contributors

Cover: Dr. Augustine Henry, seated second from right, at a campsite in the Rocky Mountains.

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EDITORIAL

One Man's Contribution

"The necessity which will always exist for timber will necessitate in future great forest reservations, so there is hope. A forest is the finest thing in the world."¹

Augustine Henry, the fiftieth anniversary of whose death we commemorate this year, wrote these words when working with the Imperial Chinese Customs Service at Szemao in southwestern China. Henry was not a forester at that time. He was not even a qualified botanist although he was firmly established in that field as a result of his untiring and meticulous work in plant collection in China. He remained in China for nineteen years and towards the end of his time there he became more and more interested in trees.

Irish foresters have good reason to cherish Henry's memory. He took up the Chair of Forestry at the College of Science in Dublin in 1913, but his contribution to Irish forestry had begun many years earlier. In his recognition of the importance of hybrid vigour and his tree breeding work at Kew he was ahead of his time and gave impetus to what was then a new science and which has now become of such importance to us here. Indeed, had his ideas on the importance of provenance been more widely recognised at the time, costly errors might have been avoided.

In 1907, as an expert witness before the Departmental Committee on Forestry, Henry had argued strongly in favour of the widespread use of conifers. It was he who pointed out the similarity between our climate and that of coastal northwest America. Plantings should be concentrated on species from this region. He considered it was essential to choose fast growing species giving quick returns. If afforestation was to be embarked upon, it should be on a realistic scale, commercial forests giving real returns. These ideas, which for the most part we accept now were quite unorthodox at that time. Had we not had a man of such vision, where would Irish forestry be today?

1. Reprinted from Sheila Pim's excellent biography of Professor Henry, "The Wood and the Trees" with permission of the author.

The Society of Irish Foresters

The Society of Irish Foresters was founded in 1942 to advance and spread in Ireland the knowledge of forestry in all its aspects.

The main activities of the society centre around:

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- (d) Annual Forest Walks held on 2nd Sunday of September

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Submissions to the journal will be considered for publication and should be addressed to: Dr. E. P. Farrell, Editor, Irish Forestry, Department of Agricultural Chemistry and Soil Science, University College, Belfield, Dublin 4. The attention of contributors is drawn to "Notes for the Assistance of Contributors" on page 80.

Sales and advertising are handled by: Mr. M. O'Brien, Business Editor, 17 Watson Road, Killiney, Co. Dublin. Tel. 01-867751.

Forestry — A Personal View¹

T. CLEAR

Professor of Forestry,
Agriculture Building, University College, Belfield, Dublin 4.

I confess Mr. Chairman, that when you invited me to address this meeting I was at a loss to know what to talk about. Your members present here include those who are now in the forefront of modern silviculture, research and inventory and who regularly participate in international consultations on every aspect of world forestry. It was suggested by you that forestry in Ireland was at a cross-roads and that it might be worthwhile to have a look at some of the major issues in forestry today or directions along which forestry might move in the future. I felt that it would be pretentious to take up that aspect and I was happy to have the title suggested in your letter, "Forestry — A Personal View".

FIFTY YEARS OF FORESTRY

It is much easier for me to look back than to look forward to survey the milestones that have been passed on the road to our present impressive state of development, rather than to try to identify "major issues" in the future. I will, however, not entirely avoid commenting on the road ahead. I can look back over 50 years of forestry here — a full rotation. During that time there have been major developments in Ireland in many fields, not least in the field of forestry. The planting and replanting programme carried through since 1929 has transformed much of upland Ireland and has also changed us from a country with a shameful and rapidly declining timber resource to a situation where Ireland is not alone approaching self-sufficiency in timber but is promising to help meet Europe's yawning wood deficit. The young trees planted have, on the whole, fared well, nearly a million acres of lush forest clothe the bare uplands of earlier days and large amounts of good quality timber are already being harvested and impressive quantities are on the way. The successful establishment of the large — indeed for

¹ Based on a presentation to the Forestry Group, Agricultural Science Association at Belfield, December 7th, 1979.

Ireland — vast areas of productive coniferous plantations which are a source of wonder and, let us face it, dismay to many people has brought its own problems and opportunities to the foresters of the future.

There is no doubt that the greatly expanded planting programme which followed the introduction of the plough was in some senses “overdone”. In large measure, foresters today have to cope with results of past policies and procedures which are no longer considered valid. The nature and relative importance of the problems that have arisen or are likely to arise are by no means peculiar to Ireland but the solutions that have to be worked out and the priorities and opportunities that are likely to arise have no close parallel elsewhere in Europe. We may well have to work out our own salvation but we should also not hesitate to look further afield for guidance.

PAST POLICIES AND PROCEDURES

It might be a useful approach to look at the issues confronting forestry in the year 1979 by reference to the past policies and procedures that may have conditioned our present forestry estate in one way or another. Organised forestry in Ireland, as we know it today had, I suggest, its origins in the recession of the early 1920's and to an even greater extent to the depression of the 1930's. Afforestation was, in those days, looked upon favourably in Ireland as in many other countries as a useful opportunity for unemployment relief. Numerous afforestation schemes were initiated and carried out to employ former small farmers ruined by poor prices and the general collapse of marginal subsistence farming which was a feature of the times.

State forestry had been proceeding slowly and sedately and very cautiously during the first 3 decades of this century. Techniques and attitudes were patterned on those followed by generations of tree planters on large private estates in Britain. Traditional species like oak and beech, Scots pine and European larch predominated and activity was confined to safe old woodland sites or small areas of abandoned rough pasture, increasingly available due to the depressed state of agriculture. Planting operations were on a small handy scale. A wide range of species could be tried in any one forest with frequent changes in selection in line with accepted indicators in ground vegetation. Forest establishment was a relatively simple affair, closely controlled by trained working foresters and head labourers. Rural labour was plentiful and skilled in the use of the spade and mattock, felling axe and saw. Occasionally intractable ground had to be tackled; steep or stoney ground or peaty patches specially prepared by more intensive methods.

Tentative efforts on specially difficult sites, on land not hitherto improved or reclaimed from the mountain showed foresters how ill-equipped they were to move on to the type of larger scale afforestation that came in the 1930's. We are inclined to be surprised at the great programmes got under way in New Zealand and South Africa in the depressed '30's. Unlike their counterparts in those countries where foresters were not confronted with serious soil problems, our foresters had to resolve the problems of large scale afforestation on severely degraded sites to which forestry tended to be relegated. Podzolisation, peaty soils, water-logging and sterility occasioned by centuries of land hunger and pressure on sub-marginal land made it difficult to boldly acquire sizeable areas of land suitable for commercial afforestation with the trees and techniques then available.

THE FORESTRY PIONEERS

Foresters realised from early on that they could not depend on the indigenous or familiar European trees if they were to successfully extend operations into the uplands and the west. The problem of suitable exotics was by no means as straight-forward as seen in retrospect. We are all now very much aware of the significance and value of Sitka spruce and Lodgepole pine in Irish forestry. Their introduction on a wider scale was largely due to the vision and efforts of men like Henry, Forbes, Crozier and Anderson. A. C. Forbes, who may be fairly said to have initiated modern forestry here and who served as first Director of Forestry in Ireland, was retained by University College, Dublin, to take charge of the forestry class that registered in the Autumn of 1930 of which I was a member. One would welcome a whole book on the man and a wider recognition of his contribution to forestry in general and Irish forestry in particular. I propose to refer to one or two episodes which throw some light on the question of finding suitable exotics. Mr. Forbes managed a field trip to Camolin Park and brought us along to where he had carried out one of the first major plantings of Sitka spruce. He related how a severe late frost had blackened and apparently destroyed this newly established trial plantation. Accompanied by a senior official of the Department of Agriculture, to which forestry was attached at the time, he visited the scene and viewed the stricken crop. The official turned on him in disgust and anger and according to Forbes said, "That is the end of this forestry nonsense as far as my Department is concerned". Happenings such as these were by no means rare and it is not surprising to recall that many foresters were Sitka shy in the early days. At the time of our visit to Camolin Park, some twenty years on, this was a flourishing pole crop and continued to be an outstanding living example of the potential of this great tree for

many years. One could only agree with Forbes and Anderson in those days that one had to go cannily with new exotic conifers like Sitka spruce and Douglas fir.

FORBES' CONTRIBUTION TO THE DEVELOPMENT OF FORESTRY EDUCATION

It is not my intention to get side-tracked into an account of the development of professional forestry education. At the time we started the course, the association between the Department of Agriculture then responsible for State forestry and the new Faculty of Agriculture of the National University was very close indeed. A chance brought Forbes into the picture from the very beginning of our course. He was available to take full charge of our training from 1932 onwards and as a result we had the benefit of his considerable wealth of experience of forest management and his wide ranging involvement in forestry generally. Through Forbes we got an early introduction to the top field men of the day — Barry, Swords, Donovan, O'Beirne and McCaw — men who were the real pioneers of Irish forestry. There was, in those early years, a lot of doing and also a little studying. While forestry lacked the back-up of organised research it had the benefit of direct results on the ground in an array of pilot plantations about which people could talk from first hand knowledge. In retrospect one has to comment that the impact that research has had on the current basis of Irish silviculture has been nothing short of miraculous. In this context I recall an episode which has a bearing on the way the first fruits of research began to find application in the field. In 1933 in Ballyward property in west Wicklow, Dr. M. L. Anderson who had recently come into the service from the Research Branch of the British Forestry Commission, gave a demonstration to our gang of a new turf planting technique. That particular episode made a vivid impression and I have remained convinced that field demonstrations of new developments are of major value in getting research information across to field personnel.

Forbes was very conscious of the need for students to see and participate in forestry activities in areas and countries where advances were being made. He arranged for us to spend four months in Sweden where we were involved in field work in surveying, and inventory of growing stock as part of the 1st National Forest Inventory. This inventory became a blue-print for similar large scale inventories throughout the world. While it was difficult for us to foresee the application of systematic plot sampling and stand mapping in Ireland on this scale at that time it was a very valuable experience. Sweden was also pioneering in those days in peat drainage and the development of roading systems. Subsequent developments in Ireland were to highlight the value of those

experiences, the value of which could scarcely have been visualised by those involved purely in domestic forestry at the time.

OTTO REINHARD

Since this is a personal view I feel I must mention Otto Reinhard (Fig. 1). He was responsible for my period of study in Germany in 1936/7. His coming to Ireland, as some will still remember, was associated with the transfer of the Forestry Division to the newly created Department of Lands. The new Minister was assigned the task of rapidly increasing the planting rate from what was considered a more than adequate 3,000 acres a year programme in 1933, to 6,000 acres per year by 1935/36 and to continue to expand the rate thereafter. The stated intention was to extend as much as possible the afforestation to Western peat and to relieve the dire poverty in rural Ireland generally.

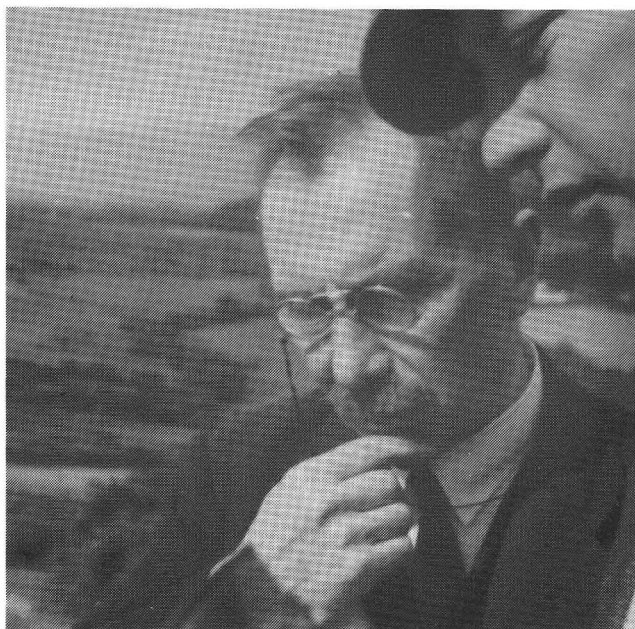


Fig. 1 — A. C. Forbes (left), first director of forestry in conversation with Otto Reinhard, director 1935/39.

(Photograph: T. Clear)

FORESTRY IN THE SLIEVE BLOOMS

When I returned from Germany I was absorbed into the Forestry Service and after a brief spell at H.Q. in Merrion Street I was assigned to Portlaoise. I had a very valuable interlude under the D.I., Mr. P. Barry. Forestry was just taking-off in the Slieve Blooms at that time. Great pioneering work had in fact been done from 1913 and most of the older foresters got part of their early training there. It was possible in those days to acquire reasonably good plantable land in the glens around Mountrath and Clonaslee which were rapidly emptying of population. Paddy Barry knew the Slieve Blooms and recognised the potential of Sitka spruce as the tree for the wetter gleys and peaty gleys as well as the brown bracken coated podzolics. Blanket peats were avoided. The plantations which I had seen on the occasion of my first visit to Baunreigh in 1929 on a career guidance outing, had now begun to extend into the neighbouring valleys and slopes and one had direct evidence to go on. When I visit the areas around Ballyfin, Clonaslee, Capard, Camross and Kinnity today I marvel at the vast change that has been wrought in the hills of my native region. On a recent visit to North Leitrim I could not fail to be struck with the signs of things to come which will, no doubt, in time bring to that region the same dramatic improvements that forestry has brought to the uplands of Laois.

FORESTRY IN THE WEST PRE 1939

In late 1937 I was assigned to Gort and worked under Michael O'Beirne. In pursuit of the stated policy objective of carrying forestry development to the sterile uplands of the Slieve Aughty mountains and the blanket peats of Connemara we were constantly on the road inspecting offers of land on some really daunting terrain. While many nice areas of old woodland dribbled in, the lands on offer on the whole were generally considered unfavourable and so progress was disappointing. A special mission headed by Director Reinhard took the local officers in tow on a survey which, as far as my memory serves, was largely concentrated on Oughterard and Cloosh. Mr. O'Beirne and myself, together with the local representative of the Oughterard Cumman and the German Director, made the inspection. The local man was obviously anxious to ensure that the German got a favourable impression and hoped for a favourable outcome. The Forstmeister was armed with a long steel probe, and being a man of great weight and strength, had no difficulty in pushing it a full two metres or more into the blanket bog at regular intervals. If he didn't strike bottom he just muttered (in German of course) "impossible". I never quite understood whether he found it impossible to believe that peat on hills could be so deep or whether he found it impossible

to believe that trees would live on it. Not so long afterwards he returned to Germany and I was called to the University (Fig. 2). It can be assumed then that it was accepted by all responsible silviculturists that forestry had no answer to the blanket peat in 1939 and that without a major breakthrough in site amelioration, forestry had no business there. I never fail to be amazed at the great transformation that has been wrought in Cloosh and was pained to learn of the great forest fire that swept through this "impossible" forest.

Foresters were less reluctant to tackle the heather covered mineral soils and substantial areas of Old Red Sandstone soils were acquired and planted. The reclamation of mountain land in the Slieve Blooms and in many parts of Munster, and also in the uplands of Leitrim, Cavan and Sligo was not a new concept. The period 1780-1845 is recorded as a time of great mountain reclamation.



Fig. 2 — Forestry students' class, 1939. Included are Professor G. J. Gorman, T. Clear, also T. O'Carroll, McGinty brothers, M. Swan, D. Quirke, P. Finnigan.

High prices for agricultural produce during the French wars 1792-1815 and the rapid increase in rural population pushed cultivation to extremes not hitherto assayed. While there was a marked drop in further reclamation after 1845 there was still an active inclination to reclaim and the techniques were well understood right up to the First World War. The art of reclamation seemed to have been largely lost as a result of the decline in agriculture that set-in in the early twenties. Land division policies and the break-up of the large estates relieved congestion and in the '30's much reclaimed mountain reverted to heather, bracken and rushes.

POOR PERFORMANCE OF SCOTS PINE IN UPLANDS

The cessation of reclamation and the abandonment of mountain land during the recession of the '20's and the farming collapse of the 30's, gave forestry a golden opportunity to acquire large tracts of potentially productive forest land without any objection from agriculture. These lands on offer were often too steep and rough to plough with the tackle then available and the only preparation possible was spot screefing to remove the heather or coarse grass and direct pitting or notching. Scots pine was generally considered the best available selection. It was widely accepted that proper reclamation for agriculture would involve deep cultivation and the mixing of upper soil horizons together with top dressing of dung or road scrapings. This could be a tedious and costly operation even on the easiest of sites and the forester hoped that the trees themselves would, in time, ameliorate these difficult conditions. While there was fair success on areas that had been reclaimed and reasonably maintained, on ground where profiles had been undisturbed results, particularly with Scots pine, were poor. Many still remember sizeable areas of crippled Scots pine choked with furze and heather which disfigured many an upland forest and dismayed forestry propagandists. In this context I remember Forbes recalling his chagrin and disbelief at the poor showing of Scots pine in Ballyhoura, an area that he himself had reported as being very favourable for Scots pine at the time of acquisition. I remember also how he constantly drew attention to the occasional Lodgepole pine that showed much better promise.

THE ADVENT OF THE PLOUGH

I believe the great significance of that period up to the advent of the plough and the acceptance of 10,000 ha as proposed by Sean McBride as an annual afforestation target that came in as part of the first post War recovery programme, and underwritten by the Cameron Report was to focus strong Government attention on the new techniques that were being introduced around 1950 in Great Britain (Fig. 3).



Fig. 3 — Roy Cameron (left) F.A.O. forestry expert visited Ireland in 1951. Pictured with him are (left to right) Professor M. Tierney, President U.C.D., T. Clear and Sean McBride.

(Photograph: Independent Newspapers)

Many still remember the heartening report Mr. McEvoy and Mr. Meldrum brought home from Britain about the work of the giant ploughs then coming into use. Foresters flocked to join a study tour to Wales to see ploughs in action. What has happened since is history and is so well recorded as to be commonplace. What may not be appreciated by many non-foresters is that large areas are now carrying valuable stands of Sitka spruce and Lodgepole pine on sites previously deemed to have very limited suitability for forestry. The irony of the situation is that the same soil types which had zero suitability for agriculture and would have been happily assigned to afforestation are now as a result of techniques largely pioneered by forestry being strongly recommended for reclamation by our agricultural colleagues. This turnabout is a measure of the great

strides made in site amelioration as a result of fertiliser use and the development of machinery which could mix the peaty surface horizon with the sub-soil horizons and break the impermeable layers. That such equipment could be fabricated or that it would be so robust and so successful in giving massive disturbance with consequential improvement of drainage, aeration and rooting availability was only a wildly impossible dream to the few. The puny efforts and the inadequacy of the tools available in earlier days are now just a fading memory. The idea that the trees themselves would in time ameliorate the most intractable soils dies hard. I recall in 1969 an eminent ecologist of world renown standing on a most impossible piece of Slieve Aughty land and expressing the opinion that if left to nature and kept out of forestry hands it would revert quite rapidly to mixed hardwood forest.

I believe that where cultivation has been intensive and thorough one can look forward to such soils behaving in time as good quality forest soils with the exciting potential for the use of more exacting coniferous and hardwood species if desired in the future. On areas where the cultivation was less thorough it may be necessary, as is happening in Germany, to apply a more intensive programme of amendments at the replanting phase.

GREAT CHANGES IN UPLAND IRELAND

The improvements effected on Irish soils by the present generation of Irish foresters is one of the most constructive changes that has been wrought in upland Ireland since Bronze Aged man removed the native oak and pine and exposed our mountains to the degrading effects of an unfavourable climate. Generations of human endeavour could only partially halt this degradation until the advent of the machine. Today we are witnessing the massive extension of the mechanised phase of hill-land reclamation for agriculture. One continues to wonder at the reclamation that is going on, some of it bordering on the incredible. According to informed reports these reclaimed podzols can at best give only moderate returns for the energy consumed in mechanical site preparation and in the use of fertilisers and lime. Even a mild recession in agriculture may well see a partial re-run of the story of upland abandonment that followed the great period of mountain reclamation of 1780-1848. In any event this great surge of development in Irish upland spear-headed by forestry, must not be allowed to falter, the long term benefits for the nation as a whole make it all worthwhile.

The successful establishment of extensive even-aged plantations of exotic conifers on soils which have not hitherto carried trees is for Ireland a matter for congratulation. The decline in new planting in recent years affords one the opportunity not only to reflect on past

achievements but to take a fresh look at the question of exotic afforestation in the days ahead. While one hopes that the decline in new planting will be reversed in the near future there is much to be done in the context of the existing forest estate. Most foresters throughout the world are aware that it is wise to have a proportion of the woodlands of a country managed along more classical lines. Extensive monocultures of alien softwood tree species are viewed by some as ugly intrusions into the landscape and a threat to native plants and animals. Foresters are at pains to demonstrate that increasingly, forest areas are required to be managed to provide not only wood and its products, but scenery, wildlife and recreational facilities.

SOIL RESEARCH A PRIORITY

The long term effect of short rotation monocultures on soil fertility and structure is not known and ongoing soil research must have a priority in this context. There is evidence from several sources throughout the world that the growth of the second crop may be significantly less than the previous crop. It may be that infertile soils will not be able to replace natural nutrients taken off in harvested trees and that the loss may have to be systematically restored by the use of fertilisers or by crop rotation. Land reclamation techniques and the use of stumps and roots as biomass may make for alternation between forestry and agriculture, with trees being followed by grass or tillage crops or by a combination of grass and trees as in New Zealand today.

NEED FOR SUITABLE REGIMES FOR SITKA SPRUCE AND LODGEPOLE PINE

It has become increasingly apparent that timber cannot always be grown profitably under regimes widely used in the past. A major problem today is to develop suitable regimes for the management of Sitka spruce and Lodgepole pine under local conditions. Sites vary considerably and the silvicultural and economic problems associated with thinning of overstocked stands to desirable density evoke much discussion. Wide planting spacings and early heavy thinning as a means of securing crop stability and a better possibility of regulating conditions of site and stock in the critical later stages are being advocated. The development of thinning systems is one of the most challenging issues in forestry today. I have been greatly impressed by the work done in this field here in Ireland, particularly by Gerhardt Gallagher. I personally have been influenced to a degree by the writings of Hiley in regard to South Africa and also by studying and seeing on the ground the New Zealand approach to the thinning and general management of exotic conifer plantations for saw-log production.

MANAGEMENT TABLES

In earlier times foresters frequently formulated their own objectives and decided the size and structure of crops and the production regime in the context of the conditions they had to contend with. The great change in recent times was associated with the introduction of Management Tables. Many people today criticise Management Tables and refer to them as old fashioned and not appropriate to present conditions. Foresters in the past, in the absence of tables, had to learn by the painful process of trial and error. Reliable methods were closely adhered to and 'new' methods advocated by cranks tended to be distrusted. Management methods formulated as a result of well planned investigations are readily accepted. Unfortunately the practicing forester has been locked in on one set of tables with little freedom of choice of action. It would be greatly welcomed if the research people would provide a solid base whereby the means and the technology for timely respacing and thinning could be applied to a variety of stands and mixtures.

Forestry and timber production in the future have to be related to the prospective economic developments both here and in Europe. It is difficult indeed to forecast the economic expansion here. The general consensus is that the long-term prospects for the forest industry are excellent. What is perhaps of more significance to forestry is the capacity of our forests to meet the demand for exotic wood in the event of the establishment of large integrated industries here.

Professor Convery in his excellent review of wood markets makes the point that the dislocations engendered by the current recession, combined with the much larger volumes of wood now becoming available to Irish processors provides an excellent opportunity for new large scale wood processing plant here. Access to computer facilities and to inventory data should be of great value to those who undertake feasibility studies in connection with the type of plant and its location. Computers should be used also to help with determining the tending and cutting schedules and management regimes to ensure that the forests will be able to meet the demand.

TRENDS IN TIMBER USE

There is a danger, however, that the trends in timber use apparently firmly established in the days of cheap energy may have begun to change in a disturbing fashion. The steady rise in total wood use in Europe in the present century, and particularly in recent decades, implies a rise of only 2 per cent compound in sawn wood while wood-based panels, paper and paper board were expected to grow at a rate of from 6 per cent to 10 per cent. In this context one cannot fail to be conscious of the present run on firewood of all kinds and to ponder on the implications for future

silviculture and industrial wood availabilities. Firewood in Europe in 1913 accounted for half the total wood used. Since that time Europe's total wood use figures have doubled, but firewood use had fallen up to 1975 from 140 million m³ to 90 million m³. Much of the firewood category material went to supply the expanding demand for industrial wood. Is this trend now likely to be reversed?

The questions arise — should we continue to make pure conifer stands or should we use more hardwoods, as a contribution to the future energy supply. On the face of it evergreens like Sitka are inherently efficient in photosynthesis and therefore comparatively more productive. There is no reason why we should not divert some of our conifer thinnings to fuel use. Could we look forward to running our silviculture and harvesting on the unmerchtable waste of thinnings, tops, branches, bark and stumps, and rather than trying to solve the energy problems of the world, try to meet local energy needs as forestry did in the past? We are looking increasingly towards Brussels and the EEC for guidance and support in relation to agriculture. One wonders why forestry has seen so little in the way of positive action or guidance or where our forestry stands in regard to Europe's industrial needs.

EUROPEAN FORESTRY DECLINE — IMPLICATIONS FOR IRELAND

European forestry has suffered in consequence of the declining role of forests and forestry in the general economy. This is evidenced by the reduction of the area under forests and the *per capita* decline in the area of productive forest except in Ireland and Britain. The reasons are not far to seek. The decline in relative importance of home wood production in value terms and the increase in costs, particularly those associated with forestry labour have not helped European forestry. Recent surveys of the economic performance of woodlands in the Netherlands lead to the conclusion that forestry in that country operates at a substantial loss. The same would likely be found to hold for most other members of the EEC. This situation must lead to a further decline in European forestry unless there is a major reappraisal of the support and the wood marketing situation. There seems to be little prospect that the EEC can revitalise Continental forestry or can secure an extension of the area under woods or plantations. The situation here, therefore, holds out major attractions in regard to the question of improving the supplies of sawn timber or industrial wood provided we are allowed to operate with an eye to maximising our comparative advantage. In this connection I am rather disappointed that the Agricultural Science Association or the Forestry Group has not come out more forcefully in regard to the proposals on Irish Forest Policy by the National Economic and Social Council and

the recommendations of Professor Frank Convery following his masterful study of the whole question of Irish forestry.

I was particularly taken with his proposals for the extending of private forestry and the potential revealed by his economic appraisal of the afforestation of drumlin soils. The whole question of the extension of forests here and the maximisation of results from further afforestation seems to be tied up with the issue of land acquisition. Since 1970 land prices generally have risen 10 times and unless and until this meteoric rise comes to a halt, the prospects for the outright acquisition of suitable land seems bleak indeed. It is in this context I suggest that the proposals by Convery and by Bulfin in Part 111A (Forestry) of the County Leitrim resource survey, should be the subject of a full scale seminar by the full Association or by the Forestry Group.

My primary purpose this evening has been to draw attention to some of the major developments in the distant and recent past. I believe there is a major need for our profession to become more active in publishing the benefits which man derives from forestry and the challenge that forestry offers to the coming generation. The general public appreciates that wood fulfills numerous requirements in mans domestic, agricultural and industrial activities but the many benefits are only gradually coming to be recognised. Environmental forestry is here to stay and is providing a broader concept of forest management in Ireland. Foresters must increasingly be ecologically orientated and seen to be interested in applying ecological principles so as to ensure that natural resources are handled without prejudice to future resource use. Today, aesthetic, recreational and amenity considerations are beginning to rank equally in importance with wood products as important contributions from forest land. I trust that through the dedication and quality of the members of this association, Irish forestry will be well served and that as a result increased recognition will be given to the role that forestry plays in the affairs of this nation.

Tree Farming in Ireland: Potential and Prospects

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The potential for using the drumlin soils in Ireland for commercial tree growing has been a recurring theme in Irish forestry circles for more than a decade. There are a number of reasons for this interest. These soils are remarkably productive for tree growth, and productivity estimates, based on actual per acre output from both state and private forests, are now available.

A. O'Rahilly and Robert Tottenham, who have tree farms in County Leitrim and County Clare respectively, have been enthusiastic and articulate supporters of forestry on those lands, and their views have been orchestrated to some extent by Professor T. Clear of University College, Dublin. The Agricultural Institute, in its resource survey of Co. Leitrim, concluded that much of the drumlin area could be afforested to the national advantage. An estimate of Leitrim's soil productivity for tree growth was prepared as part of this survey. The key reason why the tree farming issue continues to be raised is the dismal net revenue generating performance of conventional farming on these soils. Even the high output prices paid since Ireland joined the EEC have signally failed to improve the situation, nor have a variety of government supported drainage schemes and input subsidy programmes. While some of these sites can support highly profitable agriculture, sophisticated and sustained farm management is required.

Recently the author analysed a number of Irish forestry policy issues at the request of the National Economic and Social Council (NESC) (Convery, 1979). Among the topics which I examined was the economic potential for tree farming on drumlin soils.

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RESULTS OF THE NESC STUDY

RETURNS TO TREE FARMING

An excellent analysis of the returns to tree farming was undertaken by T. Rea (Forest and Wildlife Service) on behalf of a joint North Connacht Farmers Cooperative Society (NCF) — Forest and Wildlife Service (FWS) committee. Six farms in County Leitrim were selected for the analysis. These were assigned to yield classes by acquisition inspectors, and then work-study inspectors of the Forest and Wildlife Service estimated the current (1977) costs of crop establishment and management; revenues were estimated using 1977 prices. The outputs were reduced by 15% to account for anticipated losses due to windblows, frost, fire, insect and disease attack etc. The results are summarised in Table 1. If the real (i.e. net of inflation) interest rate is 4 per cent, then an investor could afford to borrow money at this rate and from the harvest proceeds pay all of the outgoings for tree crop establishment and management, pay back the loan (including accrued interest) to the bank and pay the landowner between £45 and £37 per acre per year (depending on site class) in 1977 for the right to grow wood on this land. It is important to note that the payments to the landowner are expressed in 1977£; this means that if wood prices keep pace with inflation and the other assumptions hold, the investor can afford to index the payments to the landowner so that these amounts too keep pace with inflation. If money were borrowed at a real rate of interest of 7 per cent the amounts which could be paid to landowners drop sharply, falling in the £10 to £19 (1977) per acre range.

The total and per acre cash flows expected over time on a Yield Class 24 site of 24 acres are listed in Table 2.

RETURNS TO AGRICULTURE

The average returns per adjusted acre¹ on Group 2 soils (which includes the drumlin soils) for all uses and a few representative activities are listed in Table 3. These data are taken from the Farm Management Survey of An Foras Taluntais. Family farm income is defined as gross output less operating expenses. It does not allow for the cost of family labour, management and most² capital invested in the farm business. Management and investment income is defined as the income remaining after these 3 additional cost items have been deducted. It is exactly equivalent to the annual allowable payments estimated earlier for tree farming. Except for dairy farming in 1977, all of the net returns per adjusted acre are negative; this contrasts with the returns to tree farming, which range from £45 to £10, depending on the interest rate used and the

Table 1 Present Worth, Annual Equivalent and Internal Rates of Return, Co. Leitrim, Case Study Areas, 1977.

				Present Worth per Acre (£)						Net Annual Equivalent per Acre		Internal Rate of Return (%)
				Revenue		Costs		Net Worth				
Site No.	Area (Acres)	Yield Class	Rotation Age	4%	7%	4%	7%	4%	7%	4%	7%	
1	80.5	22	40	1,033	384	296	245	737	139	37	10	9
2	27	22	40	1,033	384	253	207	780	177	39	13	9.5
3	16.35	24	35	1,076	441	260	217	816	224	44	17	10
4	24	24	35	1,076	441	241	200	835	241	45	19	10.5
5	23	24	35	1,076	441	241	201	835	240	45	19	10.5
6	22	24	35	1,076	441	254	211	822	230	44	18	10.5

Source: Forest and Wildlife Service.

Table 2 Revenues and Costs, Total and per Acre, Site No. 4, Yield Class 24, 1977 Prices (£), Area 24 acres.

Year	Total (£)			Per Acre (£)		
	Revenues	Costs	Cash Flow	Revenues	Costs	Cash Flow
0		3,000	-3,000		125	-125
1		64	-64		3	-3
2		131	-131		5	-5
3-7		64	-64		3	-3
8		171	-171		7	-7
9		64	-64		3	-3
10		144	-144		6	-6
11-12		64	-64		3	-3
13		265	-265		11	-11
14		502	-502		21	-21
15	1,791	514	1,277	75	21	54
16		136	-136		6	-6
17-18		64	-64		3	-3
19		96	-96		4	-4
20	4,071	637	3,434	170	27	143
21		136	-136		6	-6
22-23		64	-64		3	-3
24		154	-154		6	-6
25	5,597	491	5,106	233	20	213
26		136	-136		6	-6
27-28		64	-64		3	-3
29		96	-96		4	-4
30	8,228	406	7,822	343	17	326
31-33		64	-64		3	-3
34		96	-96		4	-4
35	72,351	364	71,987	3,015	15	3,000
Total	92,038	8,633	83,405		360	3,475

Note: Numbers may not sum to totals shown because of variance due to rounding.
Source: Forest and Wildlife Service.

productivity of the site. Since the returns to agriculture are averages, actual returns are distributed equally above and below these estimates. It is clear that if the return to resources invested is used as the criterion for allocating land, then it would be advantageous to grow trees on some of the land now being farmed. With regard to employment, it is difficult to compare the impacts of the alternative land uses directly, because of the time dimension in forestry operations. In general however, it can be said that tree farming will provide less employment than agriculture on the land during the tree growing phase, but much more total employment later on when the wood is processed. The impacts on the physical and visual environment of a change from agriculture to forestry³ are not likely to be adverse, and may be mildly beneficial. The effects of such a change on the balance of payments and regional development will be positive. Therefore I conclude that it is in the national interest to encourage tree farming on drumlin soils.

Table 3 Average per Acre Returns to Agriculture on Drumlin Soils.

	Average per Adjusted Acre			
	Family Farm Income (£)		Management and Investment Income (£)	
	1976	1977	1976	1977
Soil Group 2 (includes drumlin soils)	58.3	37.5	-19.7	-24.4
Mainly Drystock	50.2	37.5	-19.7	-24.4
Hill Sheep and Cattle	34.7	31.8	-53.6	-71.5
Mainly Creamery Milk	74.6	77.3	-12.2	7.8

ISSUES IN IMPLEMENTATION

If the returns to investment on drumlin soils so favour tree farming, will not normal market incentives result in the most efficient land-use mix? To some extent, these forces are already working; there is increasing interest by entrepreneurs, banks and land-owners in tree farming. However, the socio-economic characteristics of the predominant proportion of the land-owning population are such that market forces alone are unlikely to be sufficient to achieve the appropriate level of investment. Even a real rate of return of 30 per cent per annum is unlikely to be of much interest to many 70 year old landowners if they have to wait 35 years before the return on their investment is realised. Likewise the capital market is imperfect; lenders are not used to dealing with the planning horizons involved in forestry finance, and lack the technical expertise to evaluate loan applications. Markets in immature plantations have yet to develop.

Even if market forces could be depended on to achieve the requisite change in land-use, they might not necessarily do so in a manner most consistent with the national interest. To illustrate: much of the very extensive private tree planting which took place in recent years in Scotland was stimulated by the ability of investors to expense most of their outlays on forestry. This means that they could offset these expenditures against current income in deriving taxable income. Thus, if their income tax rate at the margin is 60 per cent, an investment of £10,000 will only cost the investor £4,000. If such a provision were to be made available to Irish taxpayers, we could see considerable investment by those with high marginal income tax rates in the purchase and planting of drumlin lands. While this provision would effect the land-use transfer from agriculture to tree farming, I'm not sure that it is a model we would want to emulate; the land and trees would probably be owned for the most part by relatively rich residents of Dublin, while the local residents would be left in the role of overseers and caretakers. A few alternative approaches are outlined below.

IMPLEMENTATION

In order to allay the suspicions and fears of the people in drumlin areas, it should be made absolutely clear that only landowners wishing to participate in tree farming need do so; no compulsion will be involved. A modest total area goal for tree farming should be established, e.g. 20% of the total drumlin area, about 500,000 acres. This would help allay fears that the area was going to be totally covered with trees. The programmes would be targetted at two categories of owners: (a) Those who wish to afforest some of their own land, and harvest the proceeds. This type of tree farming

should be attractive to young (25-35 year old) farmers who have sufficient land that they could allocate some of it to a use yielding no immediate return. Pig farmers might fall into this category. Landowners whose main occupation is not farming might also be attracted to tree farming; approximately one-third of Irish landholders classify themselves for census purposes as having occupations other than farming, and this category of landowner is growing rapidly. (b) Those who wish to rent their land for tree farming. This choice might be attractive to the owner types discussed in (a) above, but it might have particular appeal to older landowners.

An intensification and extension of current landowner assistance efforts would be sufficient to service the needs of those who wished to tree farm on their own land. However, to institute a tree-farm rental programme would require involvement in a financial "bridging" programme; at present, almost regardless of the attractiveness of the rate of return, financial institutions are not geared to handle the 15-20 years during which the rental would have to be paid without an significant revenue accruing. There are various possible mechanisms for doing this — using a European Investment Bank loan or government funds to finance the early payments, for example — but these need to be systematically explored and then acted upon.

Implementation of the EEC supported so called "Gundelach Plan", which will give up £400 million for infrastructure development of agriculture in the West of Ireland, provides a wonderful opportunity for tree farming and the forestry profession to make a substantial contribution to the welfare of the western community. What is required is full blooded commitment to the realisation of their opportunity. Who is going to take the leadership role in insuring that tree farming is given the resources and priority in this development effort? In Table 4 the annual rentals required to finance a tree farming programme of 10,000 acres per annum at £40 per acre for 15 years are listed. After 15 years, revenues would begin to be generated, and in any event "normal" financing would pay a predominant financing role thereafter. How would implementation best be handled? The agricultural advisory service is being reorganised, and is now in a state of organisational flux. This might be an appropriate time to introduce a number of tree-farming advisors into the service, backed up by a research programme at An Foras Taluntais. Another approach would be for the Forest and Wildlife Service to build on the services it already provides. What roles might the Society of Irish Foresters, and the forestry and related professions, play?

I believe that our profession now has an opportunity to contribute significantly to the re-vitalisation of the West; it remains to be

seen whether we embrace this opportunity, with its attendant risks and difficulties, or opt instead for the less troublesome but less rewarding role of "business as usual".

Table 4 Annual Rental Payments Required to Finance a Tree Farming Programme of 10,000 Acres per Annum with an Average Rent of £40 per Acre (1977).

Year	Total Acreage Planted (Acres)	Rental Paid (1977£)
0		
1	10,000	400,000
2	20,000	800,000
3	30,000	1,200,000
4	40,000	1,600,000
5	50,000	2,000,000
6	60,000	2,400,000
7	70,000	2,800,000
8	80,000	3,200,000
9	90,000	3,600,000
10	100,000	4,000,000
11	110,000	4,400,000
12	120,000	4,800,000
13	130,000	5,200,000
14	140,000	5,600,000
15	150,000	6,000,000

FOOTNOTES

- 1 An "adjusted" acre is the designation used by the Agricultural Institute to signify land area net of roads, buildings etc., i.e. it represents the "effective" land area.
- 2 Allowance is made for payment of interest and principal on currently outstanding loans.
- 3 On the scale I outline below, which would involve the conversion to forestry of 20 per cent of the 1 million hectares of drumlin and related soils.

REFERENCE

Convery, Frank J., "Irish Forestry Policy" Part II of *Report No. 46*, National Economic and Social Council, Dublin, 1979.

A Re-appraisal of Irish Silvicultural Practices¹

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To look at Irish silvicultural practices today, it is necessary to look at their history to see how and why they have developed as they have.

The requirements for timber in the British Isles over the past few centuries have primarily been for structural purposes, or for fuel for smelting, and concentrated almost entirely on the growing of hardwoods. During the 18th and 19th centuries Britain was able to supply from her colonies, structural hardwoods that were cheaper and more plentiful than could be produced at home. This coupled with an expansion of agricultural lands and the high demand for home timber for smelting caused a diminution of the afforested area in Britain and Ireland.

In Europe however, demand could not be met by sea-borne transport, and had to be met by homegrown timber. Heavy structural timber was supplied by the hardwood forests, while light structural timber and the demand for poles of high form factor (used mainly as pit-props) was met by conifers. The growing of conifers for this end product in mind suited well the climate, terrain and industry of continental Europe. Thus evolved a system of silviculture that entailed initial close spacing, frequent thinning, long rotations, resulting in crops with high form factors and small light crowns.

Coniferous forestry in the British Isles has no such history or tradition. In 1909 a German, Wilhelm Schlich was appointed professor at Britain's first forestry faculty, at Oxford. Schlich was at this time one of the foremost men in European forestry, steeped in the continental silvicultural tradition. After the First World War it was felt that a home supply of pit-props was essential in the event

1 Inaugral address to Forestry Society U.C.D., 5th March, 1980.

of another war. On Schlich's advise, large areas (most notably the Kielder forest) were planted with Sitka spruce. Sitka was chosen because it was thought to be the only species capable of growing fast enough. The continental silvicultural system was employed. (Incidentally, at the outbreak of the Second World War, these areas were not ready for production).

Because of this influence of traditional continental methods, we have arrived at our present system of silviculture which is in essence still continental. There are apparent anomalies about using such a system in Ireland today.

Firstly, the produce originally grown using the continental method, was mine timber. Today the demand is for a whole range of products from structural timber to pulpwood. Secondly the species being grown in Ireland are radically different. In Europe the main species is Norway spruce, whereas in Ireland it is Sitka spruce (Queen Charlotte Is. provenance) and coastal Lodgepole pine, which are Oceanic in their natural environment. Ireland too has an Oceanic climate. Rainfall in Ireland is less than in the Q. C. Is., but this is probably compensated by the high water retention of many of the soils in Ireland, notably the gleys and peats. Sitka thrives in moist overcast conditions and not in direct sunlight such as prevails in Europe. Situated as we are on the western seaboard of Europe we experience one of the windiest climates in Europe. Dixon (1959) states that there are violent storms every century, severe storms every 30-35 years, and bad storms every 10-15 years. An example of a bad storm is the storm of 1974 which caused so much damage to forests in Ireland.

It would appear that we are growing an Oceanic species in an Oceanic climate using a continental system geared to a continental species and climate.

Having outlined how we have arrived at our present methods I should point out that there have been changes adopted. These include the introduction of the plough, fertilisation, increasing initial spacing to 2m x 2m, and a replacement of selective first thinnings by line thinnings.

I want to consider next, the important factors governing a silvicultural regime and how these could be applied to an Irish situation. These are:

- 1 The desired end product should be stated.
- 2 The crop should remain as windfirm as is possible.
- 3 The system used should be the most profitable.

These three basic principles will determine the species used, the types of thinning practice employed and the rotation age.

The most important question is, what type of end produce are we trying to grow. The answer to this must surely be sawlog timber, which offers the greatest monetary returns. Coupled with this is the

need to supply smaller material for pulping, chipping and other wood processing industries, which is supplied at present mainly from thinnings. Due to the poor market for pulpwood at present, thinnings are often delayed, and thinning cycles become longer, the weight of each thinning is greater because removal of greater volumes/unit area in the short term is more profitable. If first thinnings, which is usually a line thinning, is delayed the remaining crop is thrown wide open to windblow. Further thinnings will continually open the crop to windblow hazards. (The fear of windblow following thinnings is a very real one and in Northern Ireland a no thin policy is the norm for this reason). By the turn of this century the amount of thinnings will probably be upwards of three times what they are at present, so the situation can only get worse.

One solution to the excess of thinnings, is to burn them to provide electricity. If biomass is required there are probably cheaper and more productive methods of obtaining it. Also this would not overcome the pre-disposition of the forest to blow following thinnings.

At this stage a question arises, which is: What is the function of thinnings. These can be considered to be:

- 1 To give space in the forest to allow the remaining trees to develop.
- 2 An early return on investment.
- 3 To provide a continued supply to wood processing industries.

At present there is no early return on investments and no wood processing industry to supply. Because of this and the risk of windblow on many sites in Ireland following thinning, a possible answer could be to practice a system of silviculture to produce sawlog whereby thinnings are totally excluded or reduced to a minimum. this can only be achieved by (a) planting at a wide initial spacing, that would represent the final crop spacing, (b) early respacing.

Greater space will allow trees grown by either of the above methods to reach sawlog size sooner because of enhanced diameter growth (Marsh, 1960). Because of this a greater number of stems/ha can be carried as final crop sawlog. At present a final crop is around 400/ha, but with the above methods up to 700-800 stems/ha could be carried. Such a system would be more economical of manpower, but most importantly such a crop would be less pre-disposed to windblow. Total volume production may be down on conventional methods but most of the volume will be as sawlog, and that sawlog will be produced earlier.

The next step is to see how our two most successful species to date, Sitka spruce and Lodgepole pine are suited to such a system. In the case of Sitka, initial planting at say 800 stems/ha, which represents a 3.5m x 3.5m spacing, to produce a final crop would not guarantee enough trees with vigour, form, etc., to produce a good

final sawlog crop. Also the fact that the ground remains uncovered for several years would mean repeated clearing operations.

This problem can be overcome by respacing at an early age. Respacing is not a new idea. It is carried out in Scandinavia after natural regeneration. Also 'thinning to waste' in New Zealand and 'pre commercial thinning' in North America are forms of respacing. Planting of Sitka at 2000-2500/ha would give early ground cover and adequate stock from which to choose. Respacing should take place before competition sets in between the trees, which will be from 5-9 years depending on growth. Respacing can be either systematic or selective. Systematic respacing, e.g. removing every second tree, takes away the opportunity to remove the poor quality stems, slow growing trees and wolves. When respacing is selective the quality and uniformity of the stand can be improved. Selective respacing can be carried out by felling the trees at ground level, pollarding at a convenient height, or injection by chemical, such as arsenic.

The use of chemical injection for selective respacing is a little awkward, as it is difficult to see what trees have been treated. cutting at ground level is quick and convenient but will tend to uncover the ground and stumps will have to be treated against *Fomes annosus*. The method of pollarding is part of what is known as the Oceanic System or Early Final Selection. The advantages of this are that no treatment for *Fomes* is necessary, the lopped trees will suppress heavy branching on the final crop, and the ground will not be left exposed. Pollarded trees should not be cut too high or they will grow back and interfere with the final crop. The lopped stems should die in about one or two years after lopping. The crop at this stage should have 1000 stems/ha, although recent indications (Gilliland, 1980) suggest that this should be reduced to 700-800/ha to achieve the growth rates claimed for the Oceanic System. Other advantages of this system are that:

- 1 No machinery is required in thinning operations, so that no root damage can be incurred.
- 2 Constant ground cover provides a better microclimate for the growth of mycorrhizae.
- 3 The stand is never thrown open to the wind.

This last factor along with the lower centres of gravity, more comprehensive root systems, and lower top heights than in conventionally managed stands will lead to a more inherently stable stand. This results in a system which is simple and cheap to implement, giving an early return for sawlog timber. The question of the profitability of such a system is studied in a recent article by Edwards and Grayson (1979) in which they assume that the continental crops will not blow, as well as assuming certain price size curves. They state that such a system is not as profitable as conventional forestry, but their choice of price size curves appears

to be very subjective. The Oceanic system therefore fulfills the principles stated earlier that govern a silvicultural regime, viz.

- 1 Stated end product: in this case, sawlog of 0.75m^3 .
- 2 Must be windfirm: the Oceanic system is windfirm.
- 3 Profitability: it is likely that the Oceanic system will be profitable.

Admittedly some of the claims made for the Oceanic system may be extravagant, but these can be overlooked if a windfirm forest is produced. There is likely to be comment about the quality of the timber produced under such a system. At present in Ireland grading is all visual, but with the introduction of machine stress grades, most Oceanic sawlog should make general structural sawlog at least.

The suitability of Lodgepole pine to this system is the next question to be considered. Lodgepole pine would not be suitable for wide initial spacing, and if yearly respacing was to be done, careful and repetitive pruning would probably be necessary. Lodgepole would not be very suitable to a system such as the Oceanic system. Should Lodgepole be grown in Ireland at all? After a disappointing start with Lulu Island provenance we switched to coastal provenances and encountered bad form in many of the trees. Lodgepole does however fulfill an important role as a pioneer species to Sitka and silvicultural methods must be found to suit Lodgepole.

In conclusion I would like to say that there are no easy answers to this problem of what silvicultural system should be used. One possible answer in high risk windblow sites may be the Oceanic system, or other respacing systems. I do feel however that due to our unique climate, terrain and industries in Ireland, that a re-appraisal of our silvicultural methods and subsequent change is long overdue.

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What is the correct name for the Dunkeld Hybrid Larch (*Larix decidua* x *L. leptolepis*)?

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ABSTRACT

The name *Larix x eurolepis*, widely used for the larch hybrid originally raised at Dunkeld in Scotland between *L. leptolepis* (Japanese larch) and *L. decidua* (European larch) is shown to be invalid and, it is argued, should be replaced by the earlier valid name *L. x henryana*, which commemorates Augustine Henry. However, it is noted that if the parentage of *L. x marschlinsii* can be determined beyond reasonable doubt, this name could take priority over the other two. At present *L. x marschlinsii* is considered to have arisen when *L. leptolepis* crossed with either *L. sibirica* (Siberian larch) or *L. decidua*.

This paper was written to draw attention to some unfortunate nomenclatural irregularities relating to the hybrid larch raised at Dunkeld, Scotland, and commonly, but it seems incorrectly, called *Larix x eurolepis*. In the paper, I touch on matters relating to larch hybrids which can only be satisfactorily settled by detailed taxonomic studies of several taxa whose parentage is disputed; such studies, probably requiring breeding experiments followed by detailed morphological studies, are beyond the scope of this author but might usefully be undertaken by other persons with access to living plants of these hybrids and with a fuller knowledge of the taxonomy and biology of larches.

H. J. Elwes (1906) drew attention to the possibility that seedlings raised from Japanese larch (*Larix leptolepis* (Sieb. & Zucc.) Gord.; syn. *L. kaempferi* (Lamb.) Sarg.) growing near some European larches (*L. decidua* Mill.) at Dunkeld, Perthshire, might be hybrids between these two species, in the monograph he wrote with Augustine Henry, titled *Trees of Great Britain and Ireland*. Later,

Henry coined the Latin name *L. x eurolepis* for this hybrid (see Henry & Flood 1919) and this is the name widely used by foresters and botanists. However, under the International Code of Botanical Nomenclature, Henry's Latin name is invalid and should be abandoned.

The rules of plant nomenclature, laid down in the International Code, are both strict and complicated, but there are two important principles which are basic to the problem of the name for the Dunkeld hybrid larch. Firstly, the Latin binomial of a plant species or hybrid, is only valid if it is published with a description or diagnosis (defined as "a statement of that which in the opinion of its author distinguishes the taxon from others"). Secondly, the correct name for a taxon, below the rank of genus (e.g. a species or interspecific hybrid) is the "earliest available legitimate" one. When these principles are applied to the available Latin names for the Dunkeld larch, the most widely used name, *Larix x eurolepis*, is found to be not the earliest valid name.

Henry and Flood (1919) documented the history of this hybrid, noting that seedlings had been repeatedly raised from the Japanese larch trees which were growing at Dunkeld near numerous European larches. The seedlings not only showed more rapid growth (hybrid vigour) but were also different in habit, morphology and leaf anatomy from their mother trees. Henry and Flood (1919) concluded that the seedlings were the result of cross-pollination of the *Larix leptolepis* trees by pollen from the adjacent *L. decidua*. Henry read the paper containing these observations to the Royal Irish Academy on June 23, 1919, but the paper, incorporating the description of the hybrid as demanded by the rules of nomenclature, was not published until September 25, 1919 (see Henry & Flood 1919, p. 55); there is no earlier publication containing Henry's full description of this plant nor any diagnosis as defined by the rules of nomenclature.

To complicate this story, Alfred Rehder published descriptions of new species and varieties of plants, including conifers, contained in the collections of the Arnold Arboretum, Massachusetts, in July 1919. This paper included a description of a hybrid larch, which he named *Larix x henryana*. Rehder (1919) noted that the hybrid had been mentioned by Elwes and Henry (1907) and that the Arnold Arboretum had received seedlings at Dunkeld; these were raised from the same mother Japanese larches whose progeny Henry had studied. In the present collections at the Arnold Arboretum, there are five living plants, labelled *Larix x eurolepis*, which were received from the Marquess of Tullinbardine, Dunkeld, Scotland, on December 15, 1910 (Spongberg, pers. comm. 1978). Rehder (1919) did not have cones available when he published his description of the larch hybrid, but the omission of a description

of the cones does not make the name invalid as the published description is still adequate for identification of the hybrid; that is, the description is diagnostic. In any case there can be no doubt about the identity of the plant Rehder named as it is still growing in the Arnold Arboretum and an herbarium specimen is preserved (see appendix). Later Rehder (1949) realised that his *Larix x henryana* and *L. x eurolepis* were the same hybrid, and relegated his name to synonymy. but Rehder's name was validly published on July 21, 1919, so that it is an earlier legitimate name, and must replace Henry's one.

Henry was aware of Rehder's publication by the time (September) he published his paper, for he commented that "Mr. Rehder has not seen cones of this tree, and his description relates to the naked eye characters of the twigs and leaves of young trees. . . His name is invalid, being later than *Larix* [x] *eurolepis*, which was published by me with a short but adequate description in the *Irish Times*, 24th June, 1919, page 4." In fact the article in the *Irish Times* contains no description of the hybrid, nor any diagnosis (see above) — the only phrase which is remotely descriptive or diagnostic is "... seedling which are very vigorous . . ." This cannot be accepted as sufficient to validate Henry's Latin name, which is quoted in the report. The article is a straight forward account of the meeting of the Royal Irish Academy, and does not constitute a valid description of the hybrid; the article is unsigned.

In the *Gardener's Chronicle*, dated 5th July, 1919¹ (p. 4.) there is another report of the Academy meeting in which the name "*Larix eurolepis*" is again noted. However, this article does not contain a description or diagnosis either; there is a statement that the hybrid seedlings "are intermediate between the two species in the anatomical characters of the leaves, in the colour and shape of the bracts and scales of the cones, in the colour of the twigs and other details" but this is not diagnostic since none of the differences is clearly stated. Indeed there are other arguments that may be used to reject this article as the place of valid publication; for example, it may be argued that the name is only "mentioned incidently" which means it is not validly published.

Thus despite these published reports, Henry's protestations, and his incorrect assertion that his name had priority — an assertion uncritically accepted by taxonomists since 1919 — the name *Larix x henryana* has priority.

To complicate matters further, another Latin name, *Larix x hybrida* seems to have been applied to this hybrid in a *Catalogue of new and Rare plants*, published in 1916, by the American nursery of R. and J. Farquhar & Co., Boston (see Rehder 1917, 1919). This

1 Rehder (1949) incorrectly dated this paper January, 1919.

name is invalid for a number of reasons; it was published without a description, and had been applied previously to the progeny of another hybrid between *Larix americana* Michx. (correctly *L. laricina* (Du Roi) C. Koch) and *L. dahurica* Turcz. (Schroder 1894).

However, the problem does not end there, for there is another hybrid larch which was named in 1917, *Larix x marschlinii* Coaz. Coaz (1917) noted that seedlings raised from a Japanese larch growing in the arboretum of Tschärnerholz, at Murten, Switzerland, were different from the parent species. The three parent plants of *L. leptolepis* (= *L. kaempferi*) were growing beside a group of *L. sibirica* Ledeb. trees. However Coaz, having studied the Japanese larches' seedlings growing near the castle at Marschlin, suggested that the colour of the female flowers of these plants, which was red, indicated the *Larix decidua* could have been the other parent, since it too has red female flowers; the Japanese larch has whitish-green flowers. Coaz thus enquired if *L. decidua* trees were also present at Tschärnerholz, and was informed that there were two groups; one about 50 metres distant, and the second, older group — “. . . a forest of more flourishing larch trees about 100 years old. . .” — was about 400 metres to the southwest of the Japanese larches. This led Coaz (1917) to conclude that the plants at Marschlin were the result of cross-pollination of the *L. leptolepis* mother trees by pollen from the distant trees of *L. decidua*. Henry (see Henry & Flood 1919) was not so easily convinced. He also enquired about the parents, and quoted M. Liechti, Inspector of Forests at Morat in Switzerland, as stating that “in all probability” the Marschlin plants were hybrids of *Larix leptolepis* and *L. sibirica*.

Henry added that “this is not absolutely certain, as there is a group of old trees of ordinary European larch about 400 metres distant from the mother Japanese tree, the pollen of which might have been blown on the young cones of the latter.” However Henry stated that “it is very probable that the pollen came from [the] Siberian larches. . . It would seem, then that *Larix x marschlinii* is a cross between *L. leptolepis* and *L. sibirica*; but further investigation is required.” To date, no one seems to have taken up Henry's suggestion, and studied these plants in detail.

Two monographs on *Larix* have appeared since Henry wrote his paper. The first was by Ostenfeld and Larsen (1930). They commented that “Coaz can only be understood to mean, that he believes he had observed the cross of *L. kaempferi* [sic] x *decidua*; but others [meaning Henry, and Dallimore and Jackson (1925)] are of the opinion that it is *L. kaempferi* x *sibirica*.” They said that, due to the doubts expressed, it would be best “to neglect” Coaz's opinions “entirely”.

Bobrov (1972) is sure that *L. x marschlinsii* and the Dunkeld hybrid have the same parents. He commented that dendrologists often use different binary Latin names, giving as examples *L. x henryana* and *L. x marschlinsii*, for reverse and direct crosses. However, he was incorrect to suggest that *L. x eurolepis* is the reverse cross of *L. x marschlinsii* and *L. x henryana*; all of these names are applied to hybrids whose mother species is *L. leptolepis*, the pollen parent being *L. decidua*, or, if Henry's idea is accepted for *L. x marschlinsii*, *L. sibirica*.

Bobrov (1972) is generally critical of the taxonomic concepts of West European dendrologists with respect to larches, and their hybrids. He accepts the view that *L. x marschlinsii* is the result of a cross between *L. leptolepis* and *L. decidua*, without discussing the objections raised by Henry, or providing evidence that the parentage is established beyond doubt. Coaz's *L. x marschlinsii* should repay detailed anatomical study, but it is not a commonly planted tree in the British Isles and fresh material is impossible to obtain. If its parentage can be established beyond reasonable doubt, and the parents are shown to be *L. leptolepis* and *L. decidua*, (the same as *L. x henryana*) then *L. x marschlinsii* is the earliest available name for the Dunkeld hybrid and must replace both *L. x eurolepis* and *L. x henryana*. This is Bobrov's conclusion. If *L. sibirica* can be shown to have been the pollen parent, then *L. x henryana* is the correct name for the Dunkeld hybrid, and *L. x marschlinsii* will apply only to the cross *L. leptolepis x L. sibirica*.

Whatever the outcome of this problem, Henry's name for the Dunkeld hybrid larch is invalid, in that it was published after Rehder had described and named *L. x henryana*. To continue to use *L. x eurolepis* is contrary to the rules of botanical nomenclature. This conclusion means that a well-established name is no longer permitted by internationally agreed rules. As long as the International Code of Botanical Nomenclature continues not to permit the conservation of such specific names, this kind of undesirable change will continue to be imposed upon botanists and others. Until the hybrid *L. x marschlinsii* is investigated in detail, it may be suggested that the name *L. x henryana* be used for the Dunkeld hybrid larch — a strangely appropriate name for a tree which Augustine Henry studied.

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APPENDIX

Typification of *L. x eurolepis* A. Henry and *L. x henryana* Rehd.

Under the International Code of Botanical Nomenclature it is desirable, indeed necessary, to designate an herbarium specimen as the type specimen for an individual species or interspecific hybrid. Neither Henry (Henry & Flood 1919) nor Rehder (1919) did so. This is done below.

L. x eurolepis A. Henry

Although this name is considered to be no longer valid, it should be typified. In his protologue Henry did not cite a type specimen, but within the paper (Henry & Flood 1919), Henry remarked that "it is now proposed to apply to the "hybrid Dunkeld larch" . . . the name *Larix eurolepis* . . . and to give . . . the results of a careful study of the material obligingly sent by Mr. A. Murray, forester at Murthly, and Mr. D. Keir, forester at Dunkeld." Henry does not mention having access to living material. In Henry's personal herbarium, now called the Augustine Henry Forestry Herbarium, deposited at the National Botanic Gardens, Glasnevin (DBN) (see Walsh 1957), there are three specimens labelled *Larix x eurolepis*, which could have been used by Henry during this work. One is labelled "Murthly No. 4, 25.2.15". The other two are labelled "Hybrid larch Dunkeld 1/8/12". None of the other specimens in his herbarium was collected before the publication of his paper in September 1919.

As the specimen from Murthly is the only one which includes cones, which Henry certainly studied (see photo in Henry & Flood 1919), it is designated as the lectotype.

L. x henryana Rehd.

Like Henry, Rehder cited no specimen in his protologue; he simply made the statement that "plants received from Dunkeld are growing at the (Arnold) Arboretum. . ." In the Arboretum's herbarium there is only one specimen of this plant collected by Rehder before the publication of his description; it is labelled "*Larix decidua x leptolepis* Arb. (Dunkeld) 6103 Sept. 14, 1917". The accession number 6103 was for "Plants, received from the Marquess of Tullinbardine, Ladywell, Dunkeld, Scotland, on 15 December 1910" (annot. S. A. Spongberg, 9 April 1980). Although it does not bear the binomial, it was collected and annotated by Rehder, and it is designated as lectotype.

L. x marschlinsii Coaz

It has not been possible to trace any type specimen of *L. x marschlinsii*. It is possible that none was collected and preserved.

Specimens cited

L. x henryana Rehd.

lectotypus: Arb. (Dunkeld) 6103 (ie. cult. Arnold Arboretum ex Dunkeld), 14 Sept. 1917, A. Rehder. A.

L. x eurolepis A. Henry

lectotypus: Murthly No. 4 (Scotland), 25 Feb. 1915, s.n. [A. Murray]. DBN.

Notes and News

Long Term Forestry Policy for Britain

According to the British Timber Growers Association a long-term forestry policy agreed by all major political parties is now urgently required in Britain. They claim that government inaction is destroying the confidence of private timber growers at a time when imports of timber and timber products are running at £2,754 million per year. The recent report from the Centre for Agricultural Strategy at Reading University urges a planting target of 60,000ha a year, making Britain 15% self-sufficient by the year 2000. However, present planting rates are well below even this target. In 1979 new planting dropped to 20,000ha and unless government and politicians underwrite a long-term policy Britain may well fall further behind projected targets, it is claimed.

British Timber Growers Association.

Massive Loss of Forest Area

Emphasises Need to Make the Best Use of Wood

"By the year 2000, the world will have lost 320 million hectares of tropical rain forest, an area equivalent to that of Western Europe." This statement was made by Dr. W. E. Hillis of the Australian CSIR in his keynote address on "The Efficient Use of the Wood Resource" to the Forest Products Division of the International Union of Forestry Organisations' Conference in Oxford in April.

Dr. Hillis commented that the high rate of loss of forest area emphasised the importance of making the fullest use of the available wood, and the need for improved co-operation in research and development if the forests are to continue to provide man with this most versatile of raw materials. He felt that "Conferences such as this play a central role by providing contacts between specialists worldwide and identifying priorities for future research".

In Oxford, 170 scientists from 30 countries, spent 7 days in discussions, the major topics being

- variations in wood quality and the problems of optimum utilisation
- wood processing systems, and the growing importance of the man-material-machine interface
- the structural use of timber
- energy from the forest biomass
- the management of technology transfer

IUFRO All-Divisions Meeting, Oxford.

Augustine Henry Meeting

On 7th November 1980, in University College, Dublin, a meeting was held to mark the fiftieth anniversary of the death of Augustine Henry, born on 2nd July 1857 in Dundee, Scotland, studied at the university colleges in Galway and Belfast, before joining the Chinese Maritime Customs Service in 1881. While in China he made a remarkable contribution to the exploration of the Chinese flora. On his retirement from the Service, he went in 1903 to Nancy to study forestry, but soon abandoned that in favour of working with H. J. Elwes on *Trees of Great Britain and Ireland*. Later Henry became the first Reader in Forestry at the University of Cambridge, and in 1913 accepted the chair of forestry in the Royal College of Science in Dublin (later University College, Dublin). He died on 23rd March 1930.

H. M. Fitzpatrick spoke on Henry's return to Ireland as Professor of Forestry and Miss Sheila Pim, Henry's biographer, read a paper on his associations with the Dun Emer Press, one of the features of the Celtic revival early this century. Dr. J. Durand recalled Henry's influence on forestry in Ireland and J. O'Driscoll paid tribute to his work in plant breeding. Dr. C. Nelson explained Henry's influence on the exploration of the Chinese flora and the introduction of Chinese plants into European gardens.

The meeting, jointly sponsored by this society, the Forestry Graduates Group of the Agricultural Science Association, and by the Irish section of the Society for the Bibliography of Natural History was well attended and was a small tribute from Irish foresters, botanists and horticulturists to a man whose influence is still tangible in our landscape and gardens.

C. Nelson.

Another Alternative Energy Source

Methane gas produced from farmyard manure can wholly replace fuel oil for heating and hot-water purposes on a medium-sized farm, according to a report from the National Swedish Industrial Board which has subsidised research into the question. With the Board's encouragement a Swedish farmer, aided by students from Gotenburg University, installed such a system on his farm and it has worked so effectively that no oil has been used there for heating or hot water production since March of last year.

The system provides for the manure to be pumped into a hermetically sealed container with a capacity of 90 cubic metres. The manure remains there for 20-30 days at a temperature of 35°C, at which point the methane bacteria become active and produce gas. A pump is used to stir the manure for 5 minutes each day to prevent stratification. Daily gas production in the tank is some 80

cubic metres, equivalent to 40 litres of fuel oil, and this is burned in two furnaces. This would give an aggregate energy production of some 1 TWh for all Swedish farms with a minimum of 100 pigs or 25 cows.

Certain design problems remain to be solved before the system is directly profitable on small or medium-sized farms but it could already pay for itself on larger agricultural units, the Board says.

Swedish International Press Bureau.

A Better Yield from Sawlogs

The Princes Risborough Laboratory of Building Research Establishment has developed a computerised sawmilling system which will enable sawmillers to have greater control over log conversion, leading to an increased yield in volume of saleable sawn timber and hence an improved income from the sawmill. The system (Laser Optimiser and Cant Alignment System, or LOCAS) was demonstrated at a seminar held at the Newton Hotel, Nairn, Scotland, on Thursday 6th and Friday 7th November. Delegates had the opportunity to see the prototype of LOCAS in operation in the sawmill of John Gordon & Son.

Although much of the softwood timber used in the UK is imported, an increasingly important contribution comes from British-grown sawlogs and it is desirable that these should be cut to the best possible advantage. Until now, the operator has used his skill and judgement to determine how to cut individual logs to obtain the maximum amount of usable sawn timber. LOCAS had been developed by Keith Maun and Nigel Smithies of Princes Risborough to help the operator make the correct decisions. It uses a laser-scanning device to measure accurately the dimensions and shape of each log as it passes the headsaw. This information is fed to a high-speed microcomputer which carries out a complete simulated conversion on line to determine where the next saw cuts should be positioned to produce the maximum number of pieces in the sizes required. In the prototype to be demonstrated, the processed data are used to control a cant alignment aid which ensures that the operator can accurately set up the cant for sawing.

The system has been designed to fit into the existing equipment and layout of mills which use a double band saw as the headsaw, but it can be developed for use in mills with different headsaws.

Trials held during the past year have indicated that application of LOCAS can increase the yield of sawn timber from a mill by 8-10 per cent. It is hoped to make complete, turnkey installations available to sawmillers through a suitable manufacturer licensed to use the LOCAS technology. Although costs can only be estimated with caution, these suggest a pay-back period of 1-2 years on the basis of the improved yields obtained.

UK Building Research Establishment.

Forestry Meeting in New Zealand

The first ever combined Australian and New Zealand Institute of Foresters conference was held in Rotorua, New Zealand from 12th to 18th May 1980. The conference was attended by three hundred delegates, ninety four of whom had travelled thirteen hundred miles across the Tasman sea from Australia for the event. It took as its theme, "Plantation forest — what future?" and was officially opened by the New Zealand prime minister, the Hon. R. Muldoon.

Although sixty six papers were presented on a wide range of specific topics, few apart from the keynote address given by the Director of the Forestry Industry Division of F.A.O., Dr. A. Leslie, actually looked to the future. Dr. Leslie, in a rather cautious presentation did predict a bright future for plantation forestry because of the growing demand for wood, the limited land bank available for producing timber and the increasing likelihood of forests being utilised for energy purposes.

Individual papers dealt with such topics as establishment, management, and methods of improving and maintaining production in plantation forests. Also covered were industrial and marketing aspects, the role of hardwoods (eucalyptus spp.) agroforestry, forest protection and some social, recreational and wildlife topics.

An interesting paper by K. F. Wells detailed the energy costs of growing plantations. The author found that fifty per cent of the liquid fuel consumed in growing pines in a mountain region in new South Wales was used to transport workers to and from the forest. A paper by M. Henderson dealt with the serious hearing problems suffered by forest workers who do not wear ear protection when using chainsaws. Stress grading and its implications for radiata pine silviculture as dealt with by personnel from the New Zealand Forest Research Institute. The main advantages seen were that stress grading would enable new markets for the species to be explored that are closed to or difficult to penetrate by visually graded timber, and secondly it also enables economies to be made in timber usage.

Those people who may have been sceptical with regard to the experimental work with clover and Sitka spruce at Cloosh Valley and Ballyhoura in recent years, may be interested to hear that the Forests Department in western Australia is currently planting 2500 ha of radiata pine each year using subterranean clover as the nitrogen source. The soils are extremely impoverished and the trees will not grow without nitrogen inputs. Grazing is used in some situations to optimise the use of the clover.

The question of a government forest service being financially involved in timber utilisation was discussed by R. M. Cowan of the Woods and Forests Dept., South Australia. Dr. Cowan saw many advantages, the main one being better vertical integration and

understanding within the industry. Although the conference did not look too seriously to the future, the proceedings did indicate that both Australian and New Zealand foresters are thinking deeply about plantation forestry. Their plantations future will be all the more secure.

M. L. Carey.

*Record Number of 116,000 Elks Shot in Sweden
During 1979 Hunting Season*

A total of 116,000 elks were shot in Sweden during the 1979 hunting season. This is a new record and close on 25 per cent more than the previous peak figure, 94,200 registered in 1978.

The number of elks in Sweden has grown rapidly in recent years and great efforts are being made to reduce the elk population to an ecologically acceptable level. In the early 1950s the annual figure was approximately 20,000 elks shot, and as recently at 1976 the number was 57,000.

Swedish International Press Bureau.

University College Dublin Forestry Society

The Forestry Society in U.C.D. is run by the students to promote an interest in forestry and related topics in the college. Last year it enjoyed its largest membership ever with many students from outside the Forestry Department joining. During the year a number of talks were organised which included "The development of Irish Forestry" by Dr. J. J. Gardiner, "The shapes of trees" by Dr. J. White, "Teak in Tropical America" by Ray Keogh and "Forestry in Sweden" by Dr. T. Farrell. The society holds its Annual Inaugural Meeting in spring which provides a forum for debate for students and those related to the forestry services and industries. Last year's inaugural address was entitled "A re-appraisal of Irish silvicultural practices" given by the society's auditor John Gilliland and answered by Niall O'Muirghéasa and Dr. P. Joyce (Published in this issue pp. 107-111). This year in addition the society hopes to organise a number of outings for its members.

Dermot Houlihan, (Secretary).

Have you been to a Meeting?

Many of our members attend international conferences of forestry interest. If you have been to a meeting recently write to the journal about it. A brief note on the proceedings written from personal knowledge can be of much greater interest than a sterile press agency release.

The Editor.

William John Bryan

It was with great regret and shock that we learned of the sudden death of "Bill" Bryan the District Forest Officer in charge of the West Tyrone District in March this year. To those of us who worked with him the shock was increased by the fact that Bill had so fully recovered from his illness of some years ago and seemed totally his old enthusiastic self.

A native of Wicklow, Bill came north in the mid forties and having gained a Forestry Commission foresters certificate and a diploma from the Royal Scottish Forestry Society spent nearly twenty years in charge of forests in Co. Derry, mainly at Springwell and Cam. He studied for and obtained the National Diploma in Forestry becoming a Head Forester and on promotion to District Forest Officer moved to Omagh and the West Tyrone District in 1969 first as assistant and then taking charge of the District.

Bill was an enthusiastic member of our Society and indeed of every other major forestry society in Great Britain and Ireland. He was totally dedicated to forestry in all its aspects and was prepared to give all his time and experience not only to his official duties but also to organising tours, giving talks or any other activity which would further the cause of forestry in Ireland.

With his vast practical experience, keen insight into problems and his love of discussion on forestry matters Bill made a unique contribution to the education of his younger colleagues, and his opinions were equally valued as contributions to our future forest policy.

Bill's love of arguments on forestry matters could give a misleading impression of a tough character to those who knew him only casually whereas those of us who worked with him realised he was one of the kindest, fairest and most considerate colleagues one could wish for. We miss him greatly. To his wife Betty, his daughters Linda and Judy we extend our deepest sympathy.

J. C. L. Phillips.

Book Reviews

THE INTRODUCTION OF EXOTIC SPECIES: ADVANTAGES AND PROBLEMS.

Proceedings of a symposium (4-5 January 1979).
Published by the Royal Irish Academy 1980.

This interesting symposium report contains fifteen papers discussing aspects of the introduction of a wide variety of plants and animals into Ireland and succeeds in giving a fairly well balanced view of the subject. Unfortunately it suffers from the lack of introductory background information, especially since the editors have favoured an arrangement which produces a logical progression from plant to animal subjects without regard to differences in the specificity of the individual papers. In particular I would have liked to have seen an introductory mention of the relative impoverishment of our native flora and fauna *vis-à-vis* those of continental Europe and N. America, and of the potential ecological instability of our species mix in the face of both natural migration and human mediated introductions. Nevertheless a fair amount of background information is available in the introductions to some of the papers and even the non-scientific reader could get a reasonable overall picture by the time he had finished the report.

The two papers that are directly relevant to forestry concern 'The role of introduced forest tree species in Ireland' (J. O'Driscoll) and 'Exotic deer in Ireland' (R. Harrington), are both fairly general. The first of these provides a concise history of Irish forests and the importation of exotic tree species and highlights the importance of a few of the latter to current forestry. However, whilst he explains the importance of genetic variability in the seed source, he fails to underline the reasons why N. American exotics such as lodgepole pine and Sitka spruce should grow well here, or why they should be superior to recent or pre-glacial 'natives' such as Scots pine and Norway spruce. His brief discussion of timber pests mentions the advantage of importing species that are resistant to endemic diseases (Japanese larch and larch canker), and the disadvantages of unwittingly introduced exotic pests (Dutch Elm disease), but he missed the interesting variant whereby the introduction of a more susceptible host might encourage the proliferation of an established, but non-epidemic, pest (Sitka spruce & Green Spruce Aphid). Harrington's paper similarly gives a concise history of Irish deer populations together with population 'guesstimates' and an indication of the pressures that they face, but I feel that foresters would probably have liked to have seen more discussion of their destructive potential and of the possible role of the Forest and Wildlife Service in their management.

Overall I found the most interesting paper to be 'Immigrant seaweeds' (E. Lambe) since this combined a consideration of the ecological effects of natural migration, accidentally aided spread and deliberate introductions in an ecosystem where control measures are very difficult to effect and thereby highlighted the complexity of the whole subject.

John Fry.

OTHER PUBLICATIONS RECEIVED

Institute of Terrestrial Ecology.

The Ecology of Even-Aged Plantations (held over for reviews in next issue).

Sheail, J. *Historical Ecology, the Documentary Evidence*. 21pp. Price £2.00.

Nicholson, I. A. et al. editors. *Methods for Studying Acid Precipitations in Forest Ecosystems*. 36pp. Price £3.00.

National Board of Science and Technology. *Annual Report, 1979*.

Centre for Agricultural Strategy, University of Reading. *CAS Report 6. Strategy for the UK Forest Industry* (held over for review in next issue).

Forestry Commission London.

Leaflet No. 72. Thompson, D. A. *Forest Drainage Schemes*. Price 55p.

Leaflet No. 75. Jones A. T. and Smith, R. O. *Harvesting Windthrown Trees*. Price £1.00.

Leaflet No. 77. Hamilton, G. J. *Line Thinning*. Price 90p.

Leaflet No. 78. Mills, D. H. *The Management of Forest Streams*. Price 70p.

Forest Record No. 118. Gurnell, J. *Woodland Mice*. Price 70p.

Forest Records No. 121. Aason. *The Production of Wood Charcoal in Great Britain*. Price 75p.

Society Activities

37th ANNUAL STUDY TOUR, 1979

SCOTLAND

Monday, 14th May, 1979.

The 1979 annual study tour was based in the Scotlands Hotel, Pitlochry, Scotland.

The first stop of the tour was at Dunkeld Stanley Hill car park. Here our President, Mr. F. Mulloy, formally introduced the tour leader Mr. Gunnar Godwin, chairman of the Angus and Perth Region of the Royal Scottish Forestry Society, who welcomed the party to Scotland. Other members of the Royal Scottish Society to greet us here were, Mr. Chris Langton, Forestry Manager on the Duke of Atholl's Estate, Mr. F. J. Donald, Forestry Commission, Mr. D. F. D. Black, Chief Forester, Dunkeld Forest and Mr. T. W. MacMillan, Head Forester, Dunkeld Forest.

Mr. T. W. MacMillan outlined briefly the history of Dunkeld Forest, part of which was acquired from the Atholl Estates in 1937. Atholl Estates are famous for the extensive planting of larch in the 18th, 19th and early 20th centuries. In 1750, some 350 European larch trees were planted here on kennel bank of which there are still 16 survivors. About 1887 Japanese larch was planted near the 1750 planting and the first hybrid collected from the Japanese mother trees was observed in the early 1900's and became known as the Dunkeld Hybrid Larch (see E. C. Nelson's paper in this issue, pp. 112-118). In 1964 the kennel bank was acquired by the Forestry Commission so that the 'parent larches' could be managed as part of the history of tree breeding in Scotland.

From the car park we were led to the renowned kennel bank, a walk of about half a mile along the Estate avenue. Here we observed some of the remaining survivors of the 1750 planting of European larch. These trees are huge, the largest having a volume of 17.3 cubic metres with a top height of 35.9m. They are on a steeply sloping fertile site.

Mr. MacMillan stated that the bulk of their larch seed now comes from seed orchards and there is still a modest demand for hybrid larch. Originally it was intended larch would supersede oak for shipbuilding. Only the first generation hybrids give good seed. Frost was not a serious problem on the slopes but severe frosts did occur along valley bottoms. Relative to Douglas fir and Scots pine, Japanese larch suffered least damage from wet snow-storms. *Fomes annosus* is not known to have occurred on the kennel bank.

Today, in line with Forestry Commission policy, particularly in areas of high scenic value, larch plays a mostly non-commercial role. 10%-15% of all planting in these areas is designated for landscaping. Larch provides no serious difficulties with establishment, although mountain hares are a problem. Deer affect Douglas fir and *Abies grandis* to a greater extent than the larch. The average YC for hybrid larch in Dunkeld Forest is about 12.

From here the party moved back along the avenue to the car park, leaving as we went on the right, Dunkeld Cathedral. Built in 1689, it is now held by the National Trust for Scotland and currently being renovated. The stately building was partly

sheltered from our view by a large lone European larch tree 250 years old, which looked more like an oak tree in form than a conifer and still showed great vigour for its years. The party then boarded the coach and set off for the next stop at Fresh Water Fisheries Laboratory, Faskally, near Pitlochry.

The drive to Faskally took in some breathtakingly beautiful views of the Tay river valley, with its splendidly wooded slopes and its broad meandering waters.

At Faskally we were introduced by Mr. Chris Langton to Mr. B. Morrison, Senior Scientific Officer at the laboratory. We were shown to the meeting room where Mr. Morrison gave a most interesting talk with the aid of slides on the work being done at the laboratory.

The Centre was set up in 1948 to investigate the brown trout and study methods of improving the stocks for exploration by anglers. Today the study of salmon is the main priority of the laboratory.

Conifer forest-rivers have a pH of less than 5 with little bottom fauna. Where forests were older the pH was found to drop and increased almost immediately outside the forest. Their research showed no May-flies were found in streams within the conifer forest, and eggs planted in forested streams died off quickly. Studies into the effects of nutrients, mainly phosphorus and nitrogen entering streams from aerial fertilisation of forestry plantations are being made. Spraying of forest areas with certain insecticides, DDT and dieldrin have been found to adversely affect fish populations in adjacent rivers. Tests have shown the temperature of water in rivers of forested areas to be lower than that in rivers of non-forested areas.

Concluding, our President, Mr. F. Mulloy, thanked Mr. B. Morrison and the party again boarded the coach.

From Faskally we travelled to Blair Castle, the home of the Duke of Atholl. Here we were treated to lunch in the castle restaurant.

Pat Doolan.

Monday 14th, May — Afternoon — Blair Castle, Atholl Estate.

Having enjoyed a pleasant lunch most of the group had a brief look at the varied and wide collection in the main hall of the castle.

Under the leadership of Mr. C. Langton the afternoon tour formally started with a visit to Diana's Grove, a magnificent arboretum of fully grown conifers situated adjacent to the castle. Its area is two acres and most of its present stand was planted in 1872. It contains 19 trees more than 150ft tall and 9 trees more than 160ft. There are 62 trees of six different species 130ft tall and above. It is unlikely that any other two acres in the world contains such a number of different conifers of such heights and of such small age. The two largest trees seen were grand fir 178ft tall, 14ft 8ins B.H. girth and Douglas fir 175ft tall, 10ft 1in B.H. girth.

From the grove the group proceeded on a long walk up the mountainside to the peak at 1500ft. On the ascent we saw and discussed private forestry on a large scale, deer management with their associated problems for forestry. The larches and Scots pine species were the typical woods. Modern policy is to reduce the area under larch in favour of higher producing conifers such as spruce. Hybrid is the major species of the larches, and where retained will be confined to the shallow soils and high-elevated exposed sites. Windblow, windbreakage and harvesting methods seemed similar to our own. While deer graze the open forest of the estate, sheep grazing is carried on where possible.

Re-planting caused enormous problems as the soils while reasonably fertile are very free draining and suffer from a long dry spell annually in April and May causing high rate of failures. Red deer also add a major problem to re-planting, making it necessary to retain a large boundary fence at a high cost. Heavy snows which occur

annually drift and bank up against the large fence. After slight thawing, the snow forms a crust hard enough to enable the deer to walk over it into the forest.

Red deer are very numerous and must be restricted to outside, while roe and fallow deer can be tolerated within the young plantation.

At a further point along the walk we were able to see bare ground which once carried high forest, but was blown and deer have prevented re-establishment.

There is over 500 years tradition of hunting deer on the estate, and it is a major financial concern today. Deer were seen on a number of occasions this evening and one herd had up to 100 in number.

The outdoor session of the first day of the tour concluded with a refreshing return journey downhill to the castle lawn where our President thanked our hosts for an exciting and entertaining day.

J. Kilbride.

Tuesday 15th May — Morning — Forest Rannock.

Mr. F. Donald introduced our party to the local staff of Mr. P. J. Garrow, Chief Forester, J. A. Parker, Head Forester, and C. Marshall, Forester (under training) and went on to outline the layout of Old Barrack's section of the forest which is a new planting area of approximately 1500ha planted since 1961 mainly with Sitka spruce and lodgepole pine. The limiting factors of the site were the poor soil and the 1000ft elevation. The Sitka spruce was planted mainly on the flushed peats and the lodgepole pine on the drier poorer sites.

Ground preparation was by tine and turf ploughing. Planting is carried out from March to the end of June at a spacing of 2m x 2m. An initial dressing of P and K at Rate of 375kg/ha is applied, but it is expected that further dressings will be required throughout the rotation to prevent check. Some questioned the need for K in the initial dressing but the view was put forward that K helped in winter hardiness of plants.

It was believed that Sitka spruce had been pushed too far on this whole area at the early stages and perhaps the choice of a low input and low output lodgepole pine would have been better.

The main provenances of lodgepole pine used were N. Coastal Skeena and some inland which was found more susceptible to deer damage. In discussion Mr. R. Lines believed that in time a provenance to suit each site type would have to be selected to make the optimum use of site potential.

A very real problem existed in establishing forestry in this area which was the presence of about 300 red deer in the confines of the forest with many more outside the perimeter fence.

A survey showed 46% of all trees in this part of the forest were damaged to some degree, with lodgepole pine being mostly affected especially in the early stages of growth. Damage to Sitka spruce by stripping seemed to occur much later at about 20 years of age of the crop.

Management of crop was to be a no-thinning regime with the object to get a final crop in the shortest rotation possible. Cost of roading was a major factor in deciding on this regime. However due to the sizeable windblow caused by the deer damage it was felt by some that the deer were doing the thinning anyhow.

Discussion centred on the profitability of planting such land for a return possibly as low as 1% in real terms. However it was expressed by some that with the high rate of inflation and low return on investment currently it may not be such a low return as first appeared. Control of deer numbers within the area was discussed, when it was learned that it required the services of four rangers to keep deer populations in hand involving an annual culling of 220 red deer and 130 roe deer. In new planting, glades for deer were left along banks of streams for ease of management.

Tuesday, 15th May — Afternoon.

After an enjoyable lunch the Society was shown an area of Barracks Section planted in 1961 with 3 different provenances of lodgepole pine. Mr. R. Lions informed us that the provenances used were:

1. *Sooke* — which originated from the southern tip of Vancouver Island. This provenance is similar to that of Lulu Island but is more vigorous than the latter. It is not a fast growing provenance but it shows little basal sweep. Unfortunately it suffers from wind blast.
2. *South Coastal* — as its name suggests this provenance originated from the south Washington coast. It is a vigorous provenance with heavy branching — the branches being so dense that the main stem is obscured. Its bark is very rough so it is more resistant to deer stripping.
3. *Inland* — this provenance originated from the interior of Washington, British Columbia and Oregon. It is a finely branched provenance with the branches being divided into secondary and tertiary branchlets. The needle colour of this provenance is light green — tending to yellow if unfertilised. the bark is thin, thus making it susceptible to deer damage.

In the discussion that followed it was ascertained that fertilisation was considered economically justified at costs of £29- £40 per ha when yield classes of 9 to 10 were expected on the site. High pruning was not considered to be an economic proposition on lodgepole pine and was only considered justifiable on high yielding crops of Douglas fir and Scots pine.

As there was considerable evidence of bark stripping caused by deer in the three compartments of lodgepole pine, the discussion then centred around deer damage and control. Mr. Phill Radcliffe of Forestry Commission red deer research programme spoke of the changing population dynamics of the red deer which is occurring as a result of the increased shelter and feeding available to the animals in the plantations as opposed to those of the open hills. In Rannoch Forest the deer are increasing at a rate of 20% to 25% each year and consequently increased culling is necessary. To facilitate this it was found necessary to provide deer lawns of ½ha in size, numbering 5 per 100ha, i.e. 2-3% of the total planted area. The red deer density in Rannoch Forest is approximately 15 to 20 per 100ha.

The bark stripping caused by the deer during the winter and spring months can cause degrade in sawlogs, be responsible for windbreak and also allow the entry of butt rot — particularly in Norway and Sitka spruce.

After rejoining the coach at the Bridge of Gaur, the Society then travelled to the Black Wood of Rannoch. Here Mr. J. F. Donald recounted the history of this 100ha of old "Caledonian pines". This natural pine forest was part of the Dall estate which was forfeited to the Crown Conservators after the 1745 rebellion. Limited grazing was allowed during this period with its consequent effect on regeneration. The estate was subsequently returned to its owners and large scale commercial exploitation commenced in 1840 by floating the timber to Dundee by canal. Further exploitation took place during the construction of the Highland railway, a little during the 1914-18 war and a considerable amount of timber was removed during the 1939-45 war by Canadian foresters. The Forestry Commission acquired the wood in 1947 and its importance as a native pinewood was recognised and set aside as a research reserve. An early decision was taken that planting with Scots pine within the Rannoch area was to be limited to Scots pine of Rannoch origin only.

In 1975 the area was designated a Forest Nature Reserve and the Forestry Commission decided to ensure the conservation of the woodland by trebling the area under forest.

In the course of a very pleasant walk through the Black Wood the Society was shown the following:

1. An experimental area laid down in 1949 to investigate ground treatment in relation to Scots pine regeneration. In this area Scots pine seed was sown, but only birch and rowan survived because of deer browsing. Also it was shown that the thickness of the *Calluna* sward and moss impeded the Scots pine regeneration.

2. An additional experimental area where fencing and ground preparation had been carried out. Regeneration was more successful here but the poor form of the parent trees was commented on. The Society was told that this may be phenotypic rather than genotypic particularly where exploitation removed all the good stems and the fact that young stems which resulted from the regeneration were of good form.

3. The final stop was at an abandoned old nursery site and is now heavily stocked with Scots pine and birch. This site is being managed by a policy of non-interference.

The Chairman for the afternoon thanked the leaders and closed the proceedings at the end of a very interesting day.

J. P. Connelly.

Wednesday, 16th May — Morning.

This morning in the lightly falling rain our coach sped through the Dunkeld larchwoods and on through rolling farmland with its crops of grain, potatoes and soft fruit. The towns of Blairgowrie, Kirrimuir and Brechin, we soon left behind to arrive at Drumtochty picnic area of Mearns forest at 11.30 a.m. However, silviculture was not to be our morning discussion point, so we pushed on to Glensaugh Research Centre.

Here, the Hillfarming Research Organisation is carrying out interesting experimental work into the use of upland country for the farming of red deer towards the production of venison. The commercial viability of the project is also being assessed.

The deer farm which is situated at approximately 400m elevation was fenced, reclaimed, fertilised and re-seeded in 1970 and has a herd of stags, hinds (mostly pregnant) and followers for fattening.

All aspects of deer farming from fertility of stags and hinds through rearing and fattening to eventual slaughter are being studied. In conjunction with Baxters, the foal processors, the taste flavour, colour, texture and shelf life of the venison is tested in the market place.

Our visit concluded with a lively discussion on this very realistic approach to deer farming which augurs well for the future of Scottish rural economy.

J. Mannion.

Wednesday, 16th May — Afternoon — East Scotland Conservancy.

Received brief outline of conservancy by Mr. Grant, Conservator at Deer Farm.

This conservancy consists of 93,000ha, 30% of which is productive, 230,000m³ of timber are harvested per annum. Of this the 12-18cm range are used for pallet making and the smaller sizes for pulp. The 18cm logs fetch a price of £19.50-£23 per m³. The conservancy is equipped with 10 Forwarders, 19 Skidders and 6 Cable Cranes.

After being introduced to Mr. Cuthbert, the District Officer, we departed from the deer farm and visited Drumtochty car park where we met Mr. D. Elliot, the Head

Forester. Close to the car park there is an interesting Sitka spruce which is 156ft high with a girth of 21ft. It was planted in 1831, when the first Sitka spruce species were introduced into Britain.

Then we visited Mearns Forest where harvesting was in operation. This forest is located between Grampian Mountains and agricultural land. The southern block of the forest runs within five miles of the sea. There are 7,000ha in this forest which was acquired by the Commission in 1926, 1943 and the remainder in the 1950's.

The soils are derived from Old Red Sandstone, schists and granite drifts. The main problems in establishment are competition from heather in the early years, and penetration of the iron pan. The fertiliser used is phosphorous. The Yield Class for the area is 12-14.

After visiting the harvesting site a long discussion took place on harvesting. In extraction a skidder, forwarder sky line and tractor processor are used. 6,000m³ are produced with forest staff, 7,000m³ are sold standing. Price received, £17 per m³ on road. Average volume per pole = 0.4m³. The cost of the various operations are as follows:

Forwarder — £1.42 per m³.
 Skidder — £2.35 per m³.
 Sky Line — £3.51 per m³.
 Felling Cost — £1.78 per m³.

Total cost to collection point = £12 per m³. The most of the extraction is done by a Volvo forwarder which delivers 6m³ each time. The sky line is only used on the difficult area on top of the hill. Year of planting of harvesting site was 1929.

This harvested area will be re-forested with Sitka spruce. No preparation of ground will take place. No fertiliser will be applied to these re-forestation sites.

On these Old Red Sandstone derived soils there is a rainfall of 30-40 inches. This would be half our rainfall on similar sites. This results in less podsolisation in their soils as less leaching takes place.

This discussion on harvesting costs and podsolisation concluded the afternoon tour.

M. Hennessy.

Thursday, 17th May — Morning.

The Thursday morning visit was to Drommond Hill Forest. Mr. Fred Donald, District Officer, introduced Mr. Gordon McBain, Head Forester.

The plantations here, overlooking picturesque Lough Tay, were among the earliest Forestry Commission acquisitions. Some acquisitions dated back to 1914. However, the bulk of plantations dated from 1922-1923. The species here were mainly larches with some pockets of Scots pine and spruces. Severe wind-blow in 1968 had taken much of the larch overstorey. In view of the considerable amenity potential of this area, it was decided to draw up a management plan to assist the management of the forest. The plan would incorporate three main aims:

1. The production of timber.
2. Landscape enhancement.
3. Regard for recreation.

There were three ways of achieving this:

- (a) Normal rotation of felling.
- (b) Underplanting for gradual change.
- (c) Clear felling with some retention of the old crop.

It was decided to clear fell 50% of the crop with subsequent reafforestation with Douglas fir, Sitka spruce and European larch. this would involve the felling of ten thousand cubic metres over three years. Some difficulty had been experienced in establishing crops on brown earth soils with Sitka spruce doing best.

Diversifying species for colour came under discussion. Mr. M. Cosgrave pointed out that straight lines running up and down the hillside would complement a landscape already characterised by straight lines, e.g. hedges, ditches, etc.

Our next stop was at a car park and recreational centre on the shores of Lough Tay. It was an area frequently visited by tourists with a capacity for 65 cars. Running costs were in the region of £500 per annum. There was great demand in this area for public access to the forest. Before lunch a short visit to the "Fortingall Tree" illustrated the resilience of this three thousand year old Yew. It was found in 1969 to have a circumference of fifty-six and a half feet. Mr. Charles Farmer, on behalf of Members, extended his thanks to Mr. McBain.

Denis Gallagher.

*Thursday, 17th May — Afternoon.
Conservation and Wildlife Management.*

Speaker: Mr. R. Larson.

The effects of early planting of huge blocks of monocultures of the twenties and thirties is now the problem the Commission have to face, especially when the British and Scottish public think that visual aspect is more important than timber production.

As the years passed straight lines of roads and rides were phased out and by 1935 the Commission got more power for the development of parks and other amenity walks. In some areas they are now entering the second rotation, and now is the chance to make the countryside as pleasant as possible to the public eye.

Attention should be given to roads, rides, streams, edging of different species, eliminations of straight lines and the introduction of curvature, natural regeneration, introduction of the two-storied forest where large clear fell areas would be very repelling to the public eye.

The primary object is to grow timber, but money spent on timber production could provide good grounds for Game Management and Wildlife Conservation as well. The ideal is to have one person or body responsible for large blocks of land as we have in Ireland, and marry all management and wildlife conservation rather than have different organisations in the same block responsible for different aspects of management.

One could and should keep in mind to keep trees back from roads for browsing and nesting habits, find out what animals and birds live there and the management that would help to conserve them. Certain areas should be left undrained for some nesting species. The elimination of large block burning for grouse, and retention of cover for the sparrow hawk, as they help to control the rabbit and hare population. In the Commission Forests of late the red squirrel population is declining because of the change in habitat, and not because of the increasing numbers of grey. It might also be noted that the culling in winter helps to increase the population because of more food available to living stock.

There's an estimated 300,000 red deer in Scotland and this is thought to be due to thirteen mild winters in a row and the 50% natural cull did not occur. As well as that stags were normally culled where the culling of females in the winter months would be the ideal. At the moment the Sika is not thought to be a problem, but is thought to be the scourge of the future.

The easiest species be it flora or animal is what has been indigenous for centuries and to manage the habitat of that particular species with three aims in mind:

1. Resource Management.
2. Protection of a crop.
3. Species Management.

P. O'Halloran.

Friday, 18th May, — Morning.

The last day of our visit to Scotland commenced with our arrival at Scone Palace, two miles north of Perth, and home of the Earls of Mansfield. Our President, Mr. Mulloy introduced Mr. Farquhar, Factor of Scone and Mr. Taylor, Woodlands Manager, as well as the President and immediate Past President of The Royal Scottish Forestry Society. Mr. Taylor gave us a brief outline of the history of the estate, which has 1,500 acres of woodland (80% conifer, 20% broadleaf). He also detailed the various silvicultural activities currently being carried out on the estate.

Our next stop was a visit to the nearby pinetum, which dates back to 1848. Near the pinetum stands a Douglas fir, grown from the original seed sent back to Scotland by Sir David Douglas in 1834. (It is interesting to note that Douglas was a one-time gardener on the estate at Scone). Most specimen trees in the pinetum have come from Japan and North America.

E. Lynch.

Friday, 18th May — Afternoon — Scone Palace.

After a most enjoyable lunch at the palace the party travelled to the estate sawmill where Mr. Taylor gave a brief account of the work being undertaken. The mill unit consists of two self feed rack benches and one push bench. Approximately 5,000 sawn cubic feet, mainly in the form of stake material, is produced every year from thinnings and other fellings on the estate. The sawn material is used on the estate, mainly in the upkeep of fences etc.

Our next stop was at a site which originally comprised heavy scrub and rhododendron. In 1953 lanes were cleared and spaced groups of oak were planted in a matrix of Japanese larch. The larch rapidly outgrew the oak and was removed in 1974. Once the stand was opened up the rhododendron and scrub species began to recolonise the area. Part of the area has been cleaned up to give wide spaced oak and the character of the stand is now of an oak/larch mixture.

It has been decided to underplant this crop and the matter of selecting the right species was discussed at length. Most of the party favoured the use of hardwoods especially beech because of its capacity to withstand shade. Norway spruce was suggested as a suitable alternative. It would keep the oak "clean" preventing the growth of epicormic shoots and should provide some material for Christmas trees.

The party then moved on foot to a 7ha plot, reforested in 1977 using Sitka spruce with a few patches of Norway spruce and Douglas fir. Previously the site covered a crop of P/22 Norway spruce which suffered repeated attacks of *Adelges viridis* and had to be removed. Mr. Taylor informed us that prior to reforestation the area was extremely wet and was drained by a wheeled Hymac digger.

The young crop looked very promising and many in the party felt that the local estimate of yield class 16-18 was low.

Establishment costs were queried, and a figure of approximately £425 per ha was given. The necessity to fence against rabbits and to fence out a public right-of-way

traversing the area accounted for the fact that fencing alone cost £286 per ha. Plants were provided from a nursery on the estate and were costed at £24 per 1,000.

It was agreed by all that the control of weeds in this crop should little in the foreseeable future.

Our final stop was in an area of hardwood scrub. Here, representatives of Hyett Adams, distributors of Husquarna Saws, gave a demonstration on the uses of the Husquarna 140 and 165 clearing saws.

Mr. P. Fimerty on behalf of the Society of Irish Foresters thanked Mr. Farquhar and Mr. Taylor of Scone Palace for allowing us to visit the estate, for giving so generously of their time and sharing with us their experiences and problems.

J. Desmond.

STUDY TOUR PARTICIPANTS 1979

*Clotworthy R.	Kilbride J.
*Collen L.	
*Collen Mrs.	Lynagh E.
Connelly J.	
*Connelly Monica	Mannion T.
Conway M.	Mulloy F.
Cosgrave Myles	
*Cosgrave Mrs.	McGuinness, T.
Cronin J.	
Conway M.	O'Brien M.
Desmond J.	O'Callaghan P.
Doolan P.	O'Flanagan L.
	O'Halloran P.
Farmer C.	O'Halloran T.
Finnerty P.	O'Regan T.
Fleming J.	O'Sullivan D.
Fogarty M.	
*Furlong Lily	Purcell T.
Gallagher D.	
Gardiner J. Dr.	Shekleton F.
*Glennon Paddy	*Tottenham R.
*Glennon Mrs.	*Tottenham J. (Mrs.)
Hanley J.	
Hennessy M.	Verling P.
Hutchinson K.	*Van der Wel A.
Joyce E.	Whyte J.

*Associate Members.

38th ANNUAL STUDY TOUR 1980

MULLINGAR

Tuesday, 10th June — Morning — Mullingar.

In dull overcast weather conditions members assembled at Bloomfield House Hotel Mullingar for the Society's 38th Annual Study Tour.

The first stop was at Knockaville property Lough Ennel Forest. The President of the Society Mr. John O'Driscoll formally opened the proceedings and introduced us to our tour leader Mr. Liam O'Flanagan. Mr. O'Flanagan welcomed the members to the Mullingar division and introduced the local staff, Mr. M. Downes, Divisional Engineer, Mr. P. McGuire, Work Study Inspector, Mr. T. O'Mahony, Utilisation Inspector, Mr. J. Quinlivan, District Inspector, Mullingar, Mr. P. O'Kelly, Assistant District Inspector and Mr. T. Quirke, Forester-in-Charge of Lough Ennel Forest.

Mr. Quirke welcomed the tour to Lough Ennel Forest and outlined the historical background of Knockaville property. The site type of the entire property was raised midland bog with full cover of *Calluna vulgaris*. The area was ploughed prior to planting at 2.0m spacing with an adequate network of drains. Planting was carried out in 1970 with pure lodgepole pine at spacing of 2.0 x 1.5 metres approximately. The estimated Yield Class at 9 years was 18.

Mr. O'Flanagan then outlined 3 silvicultural options for the area:

Option A

This would be normal silvicultural practice as set out in the lodgepole pine yield tables.

Option B

Respacement to 800 stems per ha at 9 years of age, with all stems pruned to 6 metres in 3 separate stages. The crop to be clear felled at 35 years.

Option C

This is a no thinning regime with 3 possible rotations 30, 40 and 50 years.

Economic analysis of the 3 options showed B to be the most financially rewarding with C second best. It was also pointed out that with Option B there was 79% of the timber in the large sawlog category, it had the 2nd shortest rotation, and 6 metres of clean timber.

Mr. Downes then outlined the problems of roading for extraction of the crop. There were 2 problems:

- (i) Getting the produce to the road,
- (ii) Getting the produce from road to market.

With no existing internal road system and a sub-standard exit road it followed that whatever system of extraction was adopted it would be expensive to get the produce from stump to market, so it was important to have a marketable product.

In the discussion which followed the following points were raised:

- (a) Problems arising from natural regeneration following respacing.

Mr. O'Flanagan pointed out that it was important to respace while the heather was still on the ground, and that the debris from the trees felled and from pruning also helped to prevent regeneration.

- (b) Disease.

There were no serious pathogenic problems except *Stereum sanguinolentum* in some lop and top and *Fomes annosus* in some stumps. It was felt that treatment with urea at time of felling would reduce the incidence of *Fomes*.

(c) Windblow.

While no experience is yet available it was believed that a system of respacing at an early age would improve stability.

At a second stop in the same property Mr. O'Flanagan pointed out the evidence which showed that it was important to fell as near as possible to ground level. A number of trees had been felled at 12" to 18" above ground level leaving one whorl on the stumps, the branches from these whorls continued to grow leaving it difficult to move through the area.

Finally members were able to contrast the deep green of the re-spaced area with the yellow of the non-spaced area.

At our third stop both Mr. A. Buckley, Research Forester and Mr. J. O'Driscoll outlined a IUFRO lodgepole pine provenance experiment. The experiment contained 30 provenances and was laid down on raised midland bog, with vegetation of *Cullana*, *Sphagnum*, *Scirpus*, *Cladonia* and *Molinia* spp at an elevation of 97m with moderate exposure.

If the provenances are grouped into 3 broad provenance groups of South Coastal, North Coastal and Inland, the South Coastal are seen to be the most vigorous and the Inland provenance the least vigorous. However on more exposed sites the South Coastal suffers from a high degree of basal sweep and poor stem form.

Our final stop before lunch was at Clonhugh property Lough Owel Forest. The Forester-in-Charge Mr. J. Naughton and Mr. J. Clancy, Forester, were introduced by Mr. O'Flanagan and Mr. Naughton welcomed the tour party to Lough Owel Forest.

At this stop we saw a fine stand of Norway spruce Yield Class 22 planted in 1939. Part of the stand is being reserved as an elite stand i.e. it will be allowed to grow to its biological rotation. The discussion centred on what species should replace the Norway spruce which was due to be clear felled. The consensus was that on such a mineral soil foresters should take every opportunity to plant hardwoods.

Finally with thunder rumbling in the distance and threatening rain we were asked to contrast some *Abies grandis* planted at the same time with the Norway spruce and to put our skill and experience to work in estimating the volume of one of the *Abies*. The reward for the most accurate estimate — a bottle of wine to be presented at the Society Dinner.

P. McArdle.

Tuesday, 10th June — Afternoon.

We spent the afternoon at Derrygreenagh Bog, as the guests of Bord na Mona.

On arrival from Lough Owel, Mr. J. Quinlan introduced Mr. O'Rourke (acting manager) and Mr. Hickey (production manager) and the chairman for the afternoon Mr. Tony Mannion. Mr. O'Rourke then gave an introduction to Derrygreenagh bog.

The net area is 13,000 acres. The greatest distance N-S 15 miles and 13 miles E-W. the property is divided into 15 main blocks with some small bogs added recently or to be added.

The area is divided by the Grand Canal. The areas north and south of the canal drain into the rivers Boyne and Barrow respectively. Drainage is by gravity with the exception of some isolated spots. This bog produces milled peat.

The management's aim is the production of 1,000,000 tonnes of milled peat. 650,000 tonnes goes for fuel to the ESB Rhode power station. 340,000 tonnes goes to BNM peat briquette factory. In addition 100,000m³ (6m³ = 1 tonne) is cut as sod moss (sphagnum peat). The operation provides 500 permanent jobs and an additional 200 summer jobs. 120-140 men (including 65 fitters) are employed in the workshop to keep about 420 machines going. Training supervisors are employed to train young mechanics.

The bog is serviced and linked to the briquette factory and ESB power station by 100 miles of rail tracks, over which 4,000 tonnes of peat can be moved in 24 hours.

Harvesting can only be done when conditions are right (i.e. dry) and work then goes on around the clock.

Following this introduction Mr. O'Rourke invited us to ask questions, from which the following points transpired: There is a 25 year reserve of peat left. Approximately 700 acres are completely cut out. Staff turnover has improved but is greater in the bog than in the workshop.

During the wet weather the men are kept busy on track maintenance, (bog) timber extraction and general maintenance.

The cutaway and cutover areas are used up to now by Bord na Mona on an experimental basis for agriculture and horticulture with the main emphasis on grass production. On the question of large semi-state versus individual private development no overall policy appears to have been worked out. Good staff relations are attributed to constant contact between management and workers and "nipping problems in the bud".

For drying the peat, bright weather with a light breeze is best. Too much wind creates a fire hazard and the danger of erosion. The Bord developed its own machinery and particularly the undercarriages. A relevant point to forestry is that it is difficult to obtain oak timber for swamp shoes for tracked machines and that alternative materials have to be used. Swamp shoes (tracks) are from 3' — 5' 6" wide to give ground pressure of 21b./inch².

At this point we had to move to the workshop on account of the time. We split into two groups. From the workshop we went into the yard where we looked in amazement at the size of the machines. Many questions were asked and answered on an individual basis.

We then moved to the railhead where two locomotives each with one coach, formerly of West Clare Railway, were waiting to bring us into the bog. When we stopped and disembarked we could see the various peat harvesting machines lined up for our benefit. Here Mr. Hickey explained to us and demonstrated the various machines which are used to get the peat harvested.

The ditcher is used to drain the bog and cover the vegetation. The miller takes off a slice of peat ½"-1" deep and breaks it up. A tractor drawn harrow is then used to help dry the peat. Then the ridger moves in to 'window' the peat after which the

harvester moves in and deposits peat onto big stacks running the length of the bog (+ 1,000m) which are then covered by polythene (250 gauge) awaiting transport.

In the meantime the buses arrived. We moved on by bus to the agricultural station. On arrival, Mr. Desmond O'Brien was introduced to us. Horticulturalist by profession, Mr. O'Brien is agricultural adviser with Bord na Mona. He gave us an introduction to the agricultural enterprise of Bord na Mona. The Bord has reclaimed 1,500 acres of cutaway bog (where 0.5m on average of peat is left over mineral soil) over the country, 1,000 acres is down to grass, 500 acres to cereals. Derrygreenagh was stated in 1973 and 40-50 acres have been reclaimed annually and 300 acres are now under grass and cereals. Reclamation consists of filling in part of the drainage system laid down for peat harvesting and grading the surface to create surface drainage to remaining open drains. Basic fertilisers including copper sulphate and lime are incorporated in first cultivation after which grass is sown. The aim is to bring pH up to 5.5. Originally it can be as low as 3.5.

Poaching and bearing capacity are not considered a problem. The drying out and cracking up of the soil (peat) are considered to be a more serious problem. We were standing beside an area which was deep ploughed last year to mix peat with underlying mineral soil which it is hoped will overcome this problem and improve soil texture and fertility generally.

Cereals grown are spring barley and wheat and winter barley. Yields are average or below compared to normal mineral soils but it is expected that yields will improve as soil matures. The grassland supports a single suckler herd with calving in May-June. For first calving, Friesian bulls are used, for subsequent calves Charolais bulls are chosen. Calves are weaned in February, bull calves are fattened on the Board's beef unit. Housing takes place in November and the stock are fed on silage with concentrate for calves.

Mr. O'Brien then suggested that we ask questions. From the question why so much copper sulphate was applied, we learned that the copper deficiency under the particular circumstances is so severe that in order for the cattle to survive, four injections per year/per animal of a copper preparation are given and calves are injected at two months old. Mineral licks are not sufficient and dosage cannot be controlled.

Fertilisation of grassland consists of 4cwt/acre of 0:10:10 and 6cwt/acre of calcium ammonium nitrate over the growing season. No answer was forthcoming about the question of profit per acre. The cost of reclamation, mainly grading/drainage is reckoned to be between £400 and £500 per acre. To develop an area of say 200 acres as a farm including buildings and roading would cost approximately £1,500 per acre.

The only tree planting envisaged will be for shelter and amenity. It is expected that 5% of an area like this will be planted with that in mind. At present there are 9 acres planted at Derrygreenagh with Sitka spruce, lodgepole pine and Japanese larch.

When some polythene protruding from under the road was pointed out Mr. O'Rourke explained that used polythene sheeting was turned into loose ropes which were placed on the peat and on top of which hardcore for the road was placed thus greatly improving bearing capacity.

The president then thanked Mr. O'Rourke, Mr. Hickey, Mr. O'Brien and Mr. McAlister (station manager) who could not be with us, for receiving us so well. When we were just moving off in the somewhat empty buses a party of about 24 members led by the chairman for the afternoon appeared on the horizon. They had missed the train earlier through no fault of their own.

Wednesday, 11th June — Morning.

On the morning of the second day of the tour the participants were introduced to the private sector in Irish forestry. No better place to do this than on the Digby Estate, unique in that it is the only estate in Ireland that is 100% forestry.

Situated south of Tullamore, Co. Offaly, it comprises 263ha (650 acres) of mixed woodlands. It is also unique in that it is a seed to sawdust enterprise with a small nursery to produce plants and a rack bench to convert the produce of the forest into lumber which has a ready local sale. A staff of ten men, working under a head forester are employed. They comprise two sawyers, three tractor drivers and five woodmen, for the most part interchangeable between nursery, forest and mill as required.

The woodlands are growing on fairly fertile soil as is indicated by the Yield Classes for the main conifers. They are as follows: N.S. 17, S.S. 17, D.F. 17, J.L. 13 and S.P. 9.

Stop 1 Clonad Wood

On entering Clonad wood the party was addressed by the owner, Lord Digby, who introduced the Estate Agent Major W. B. Hutton-Bury and the Head Forester, Mr. Jack Dunne. Lord Digby then went on to outline the history of the estate.

Originally the estate came into the family in 1600. In 1903 the woods suffered considerably in the gales of that year. Between 1903 and the beginning of the 1914-18 War a major replanting programme was undertaken. Because the estate contained mostly young trees it was spared the devastation that beset many estates during both world wars. The modern history of the estate dates from 1952 when Jack Dunne took over as head forester. At that stage the estate contained many good but underthinned plantations. A decision was taken to fell and replant 10 acres per year. The sawmill was modernised on a modest scale and a local market for the produce developed.

Today the mill has an output of about 25,000 cubic feet of sawn timber per year and the annual planting programme has been increased to 20 acres per year.

At this stage of the proceedings attention switched to the plot in which everybody had gathered. A discussion on the silviculture of Douglas fir ensued while magnificent specimens of that species towered 42.5m (139 feet) into the air above the assembled foresters.

Planted in 1890 in a mixture with hardwoods the plot in 1980 yields the following statistics:

Y.C. 24, Vol. 531m³/ha., Top Ht. 42.5m Mean Tree Vol. 5.3m³.

The General consensus emerging from the discussion was that better quality Douglas fir could be grown when planted as a mixture rather than as a pure crop.

Stop 2 Clonad Wood

After a very pleasant walk through Clonad Wood, the party reassembled in an exceptionally good 21 year old Norway spruce stand. Having been lined thinned in 1972 the stand suffered some windblow damage in 1974 and was subsequently cleaned up. Today no evidence of the effect of this windblow is discernible. The quality of this stand merits that the following figures be reproduced for comparative purposes.

	Plot		Management Tables at 20 years
P/Year	1959		
Yield Class	22+	(240+)	22
Volume	147m ³ /ha	(1650 Hop. ft/ac)	93m ³
Basal Area	22.6m ² /ha	(77sq. ft/ac)	20.4m ²
No. of Stems	1483/ha	(600/ac)	1866
Top Height	14.7m	(48ft.)	11.8m
Mean tree vol.	0.10m ³	(2.7 Hop. ft.)	0.05/m ³
Mean D.B.H.	14cm	(4½" Q.G.)	11.8cm

Directly across the road from this stand some of the estate workers were busy brashing a pure Norway spruce stand which had been planted at very close spacing. The intention had been to remove 50% of these as Christmas trees at about year 5-7 but this had not been done. A discussion on the treatment of this stand followed and the consensus favoured thinning to waste but salvaging as many tops as possible for Christmas trees.

Stop 3 Sawmill

In delightful surroundings and sheltered by stately old oaks the party was treated to tea, coffee and cakes, courtesy of the estate. Mrs. Dunne and her family are to be congratulated on the excellence of their hospitality.

Fully revived by tea and coffee the party was led on a quick guide of the sawmill which was a hive of activity.

Stop 4 Derryad Wood

Traditionally the private estates in Ireland have been patrons of the hardwoods and the Digby estate is no exception. Derryad Wood is an example of oak about 120-140 years old and grown pure. The following figures are useful for comparative purposes:

	Plot		Management Tables at 130 years
Yield Class	4 (40)		4
Volume	386m ³ /ha	(4330 H.ft/ac)	210m ³
Basal Area	43.3 ² /ha	(148sq.ft.)	21.9
No. of Stems	270	(109/ac)	149
Top Height	23.3m	(76ft)	21.0m
Mean Tree Vol.	1.38m ³	(38 H.ft)	1.41m ³
Mean D.B.H.	40cm	(12¼ Q.G.)	43cm

Although containing many clean stems of fine form and carrying well developed crowns the wood in general showed evidence of underthinning. A wide ranging discussion took place chaired by Professor Clear. The general consensus was that a better crown development policy should have been practised. The problems of

keeping oak clean and preventing the growth of epicormic shoots was discussed at length. To keep oak clean and understorey must always be maintained. The difference in value between poor quality oak and oak suitable for veneer is so great as to justify a lot of care by the grower to upgrade his produce.

Kevin J. Hutchinson.

Wednesday, 11th June — Afternoon.

The tour party had the opportunity of visiting Baunreagh Property of Mountrath Forest — one of the oldest forests in the country. the main point of interest was the volume potential of Sitka spruce at 55 years. Mr. Arthur Buckley presented the research data.

The original plantation here was laid down in 1925-26 and remained untouched for 40 years. In 1966 Research Section laid down two plots in a sheltered valley on shale loams where there were particularly large trees and commenced a first thinning that year.

Plot 1	
Total Crop 1966 Pre-Thinning	
No. of Trees	2322 per ha
Basal Area	67.3m ²
Volume	922m ³
MAI	23m ³

1966 Thinning	
No. of Trees	1778 per ha
Basal Area	28.7m ²
Volume	351m ³

After Thinning	
No. of Trees	543 per ha
Basal Area	38.5m ²
Volume	570m ³
Yield Class	24

Plot 2	
Pre-Thinning 1966	
No. of Trees	2149 per ha
Basal Area	103.6m ²
Volume (Over bark)	1464m ³
MAI	36.6m ³

Thinning	
No. of Trees	1482 per ha
Basal Area	41.7m ²
Volume	529m ³

After Thinning	
No. of Trees	667 per ha
Basal Area	61.7m ²
Volume	935m ³
Yield Class	24 & 26

A stand like this raised the question of the commercial value of timber of this size in the event of sawmills not being geared to handle it. This question was subsequently put into perspective at a sawmill where trees of one cubic metre were given as the most attractive to the miller.

The question of no thinning for 40 years was raised — it would appear from the figures that the crop thinned itself naturally — 4000 stems planted down to 2223 in 1966.

The seed potential inspired further discussion and the party was informed that seed-collection presented no problem and there was no indication that seed quality deteriorated with age of parent tree.

Mention was made of oak on this site but such was the euphoria for Sitka spruce that the likely possibility of a crippled oak stand found no favour when compared with this phenomenal Sitka growth.

Its real value however, to the Forest and Wildlife Service was seen as a seed-bearing one and everyone present was glad to hear that the plots and about 5ha were to be held as long as it stood.

Stop 2

At this stop also in Mountrath Forest along the Kinnitty road a Sitka spruce area planted in '63-'64 had been aerially fertilised. The crop had been in check and showed little leader growth. This was deemed to be due to heather competition and lack of nitrogen. A chemical analysis showed very low nitrogen and potassium levels so the aerial fertilising was decided on.

Mr. Maguire (Work Study) gave a detailed description of the operation. The fertilising was done in May, 1978 with a Cessna monoplane hired from a Wicklow firm. The cost of the operation including fertilisers was £81.58 per hectare.

There was much discussion on this method of fertiliser application and the questions elicited much useful information.

The plane needed a reasonably level field for take-off and carrying an average load of 11cwt each flight took 6 mins plus 2 mins for loading. The fertiliser had to be granular for a free flowing delivery and as a result there was little suspension on the branches.

The crop was now two full seasons after fertilising and responding magnificently. Given this type of response some new thinking may result towards Sitka spruce on high elevated sites. There was no guarantee however, that the operation was a once-off job particularly with nitrogen.

The party was then given a demonstration of the tunnel plough and Mr. Jim Dillon who has done considerable work on ploughing methods was among the party and explained the details.

The single and double mould board ploughing results in considerable rupturing of the forest floor and encourages windthrow in some situations. The tunnel plough appears to go a long way in eliminating this. Sitka spruce growth after tunnel plough was comparable to that on single and double mould board ploughing and 17 years later the tunnel was still there with the water table under the tunnel.

The tunnel plough is suitable for peat 1½ metres deep where there are no obstructions such as roots or stones and where the peat is of right consistency. The general opinion was that this plough would be ideal for the midland raised bog situation. The furrow would have disintegrated by harvesting time thus leading to unhindered movement on the forest floor.

The ripper plough was then shown — this plough is for wet mineral soil and sticky daubs, used in place of the tine plough. It emerged from the discussion that the ripper plough was very good on sloping O.R.S. sites down to one metre deep. The ripper has been used with a D.4 down south with twin tines to good effect.

C. C. Crowley.

Thursday, 12th June — Morning.

On the morning of the last day of the tour we went literally from seedling to sawdust visiting Granard Nursery and then Glennon Bros. Sawmill.

First stop was Granard Nursery situated near the village of Ballinalee. Mr. J. Quinlan introduced the Forester in Charge Mr. L. Diffley and his assistants M. Lane and T. Lennane and the Chairman of the morning Mr. J. Phillips.

Mr. Diffley, in the course of an eloquent address of welcome to the visitors, gave a brief history of Ballinalee and paid a well deserved and much appreciated tribute to the late Mr. J. J. Deasy Inspector of Nurseries for his outstanding contribution to nursery development throughout the country.

The land where the nursery is now located was the property of the Wilson family at the start of the century. Later it passed on the General Sean McEoin and it was acquired by the Forest and Wildlife Service in the 1960's.

The total area of the nursery is 23.5ha comprising seedbeds, transplants, Christmas trees, meadowing, fallow, roads, buildings and amenity.

While the bulk of the production was Sitka spruce and lodgepole pine (coastal), the presence of a good variety of broadleaves was favourably commented on and their role and usefulness in general was discussed.

The bulk of the discussion centred around the problems encountered in running a large nursery and the various herbicides used in weed control varying from what might be described as the old reliables — Gramoxone and Simazine — to relatively new arrivals like Roundup and Kerb.

Keen interest was shown in how the forester dealt with the problems caused by an exceptionally dry April and May and the very good germination achieved despite the adverse conditions.

The visit concluded with a look at all the nursery machinery and the view was expressed that the land transplanted trees seen in the nursery were much superior to those produced by mechanical transplanters.

Our second stop was perhaps the highlight of highlights after seeing some beautiful Douglas fir at Lord Digby's estate and some fine Sitka spruce in Baunreagh it was very encouraging for foresters to see the fruits of their labours marketed under the Guaranteed Irish Symbol by Glennon Bros.

Mr. John Phillips introduced Mr. P. J. Glennon, Managing Director and he in turn introduced his managers Mr. Michael Glennon (Transport and Maintenance), Peter Wilson (Mill Manager) and Paul Harte (Sales Manager).

The business was originally founded in 1913 by William Glennon, father of the present managing director while the present company was formed in 1974 to continue the enterprise.

This sawmill has chalked up a number of firsts in the home grown mills sector.

First to kiln dry Irish timber.

First to chip waste for sale to chipboard mill.

First to machine and market kiln dried recessed panelling.

The present intake is 24,000m³ of sawlog per annum and a staff of 50 are employed. The group then toured the mill and were very impressed with the obvious efficiency of the operation. Keen interest was shown in the lodgepole pine used for wall cladding and the door saddles made from the Douglas fir from Lord Digby's estate. The most suitable length for maximum production was found to be 8ft due to the basal sweep. The ideal size of tree preferred by the mill is approximately 1m³. Norway spruce machines much better than Sitka spruce. The waste from the mill is chipped for a chipboard factory and the sawdust is sent to spanboard.

We were treated to a magnificent meal at Fountain Blue Restaurant by Messrs Glennon after which Mr. John Phillips in his message of thanks said that the best tribute he could pay was to quote Tim Severin's thanks to Glennon Bros. for their help in his building of the "Brendan".

Mr. P. J. Glennon in reply said that as regards the sale of home grown timber under the Guaranteed Irish Symbol it was sold for what it was — not dressed up as something that it is not and they have had no problems.

C. Jeffers.

Thursday, 12th June — Afternoon.

First stop Mullaghmeen Property, Castlepollard Forest.

Mr. J. O'Driscoll, President acted as chairman and introduced the Forester-in Charge, Mr. P. J. Morrissey and Forester, Mr. J. Kelly.

Mullaghmeen Property consists of 400ha of broad-leaf plantations, predominantly beech which makes it the largest broad-leaf plantation in the country. Planting was done in 1936. The main mixtures were beech and larch, and beech and oak.

The main discussion centred around an area of beech-oak mixture.

The managements objectives for this area are to produce a pure beech plantation by judicious selection of potential final crop trees at approximately 6m spacing and to thin towards these final crop trees, endeavouring to keep excess light from the forest floor and providing sufficient scope for proper crown development of final crop trees. Professor Cleeh stated that this crop was equal volume-wise to any similar crop of the same age on the Continent and with the present very rapid accretion of girth, it should be thinned.

The general opinion was that this crop would be of a very high value in the future due to an increase in demand, and a decrease in supply. The fact that the value for fire-wood of the thinnings and lop and top would be very much greater than heretofore was stressed. The present premium prices being paid for high quality hardwood on the Continent was mentioned.

Another opinion in favour of maintaining existing hardwood crops and the increased planting of hardwood where site conditions were optimum was expressed. It was stated that the coming generations would thank us for maintaining this broadleaf plantation too.

Second stop, Lough Park.

The President introduced Mr. E. Grennan, Wildlife Inspector, and Mr. J. Flynn, Wildlife Forester.

Traps for predator and vermin control were displayed and their uses outlined.

A discussion on how the diversity of plant life influences the variety of wildlife took place.

The problems caused by mink which are now fairly common in the wild parts of the country were discussed. Two caged mink were on view. Distribution maps for both red squirrel and grey squirrel were displayed. Squirrel damage and control methods were discussed. As the tour ended the President thanked all who had contributed to making it such a success.

Afterwards we were all invited to a very enjoyable afternoon tea at the home of Mr. and Mrs. L. O'Flanagan, which concluded an extremely interesting and informative tour. The President thanked Mr. and Mrs. O'Flanagan on behalf of everybody and then back to the buses and the annual dinner.

F. Drea.

STUDY TOUR PARTICIPANTS 1980

Charles Boyle	Nickey Kavanagh
Pacelli Breathnach	Tom Kavanagh
Arthur Buckley	Michael Keane
	John Kelly
Professor Tom Clear	John J. Kelly
Euphemia Collen	Joe Kilbride
*Lyll Collen	
*Maureen Cosgrave	Edgar Lee
Myles Cosgrave	
Peter Crowe	Jim Maguire
Charlie Crowley	Dermot Mangan
Jerry Crowley	Tony Mannion
	John Moore
Mick Darcy	Tom Murphy
Larrie Diffley	
*Edward Digby	Pat McArdle
Jim Dillon	Pat McAuliffe
Pat Doolan	Ted McCarty
Joe Doyle	
Mick Doyle	Paddy O'Brien
Frank Drea	Michael O Canabhuidhe
Andy Duffy	Seamus O Domhnaill
	Christie O'Donovan
Jim Fallon	John O'Driscoll
Frank Fee	Brendan O'Neill
Joe Finley	Tim O'Regan
Mel Friel	
Eugene Fitzpatrick	John Phillips
*Lily Furlong	
	Brendan Riney
Denis Gallagher	*Margat Robinson
Dan Gleeson	Mossie Ryan
George Harney	Bill Shine
John Healy	Freddie Shekleton
Pat Helbert	
John Hogan	
Kevin Hutchinson	
	*Harry van der Wel
Erick Johnson	*Ignatz Graf Westerholt
Christie Jeffers	*Elinor Westerholt

*Associate Members

Commonwealth Forestry Bureau

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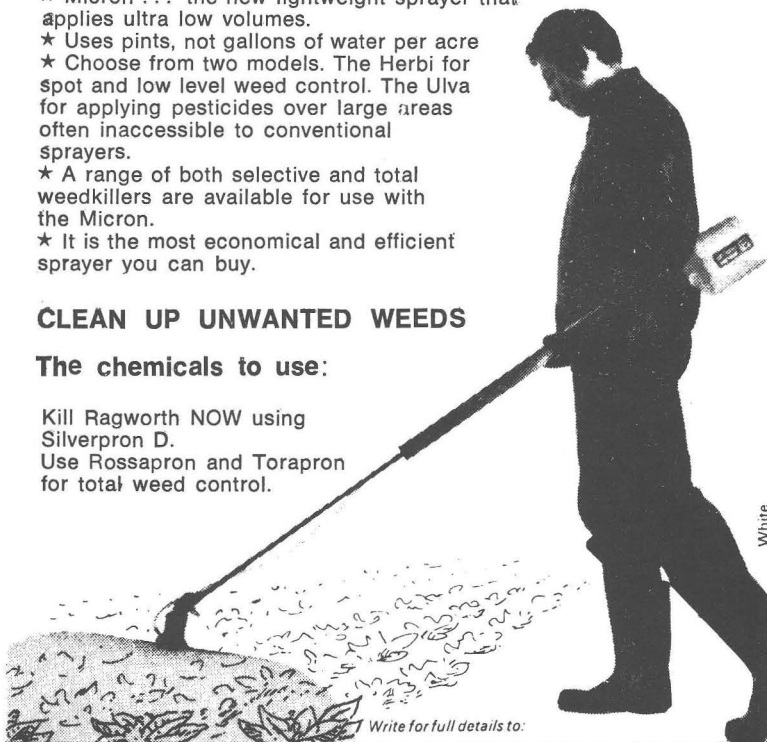
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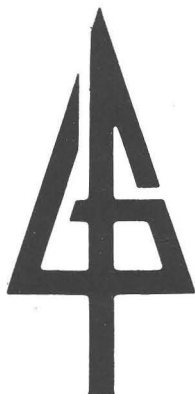
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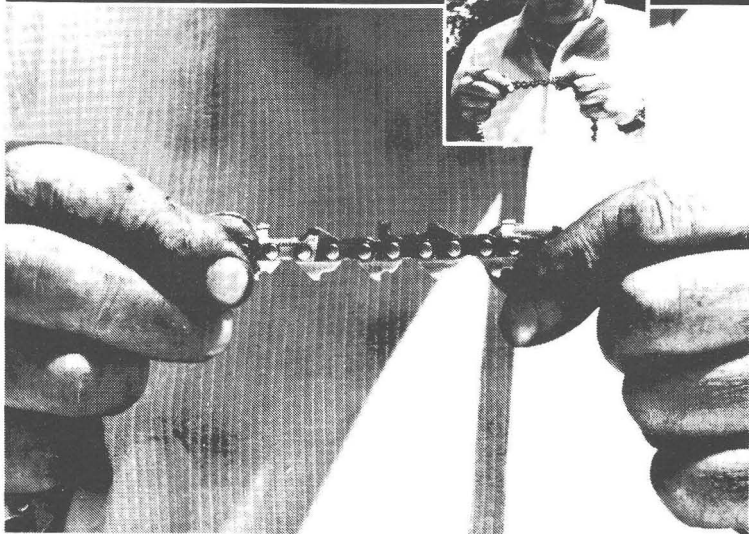
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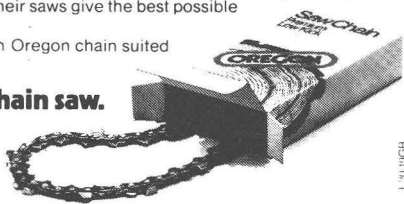
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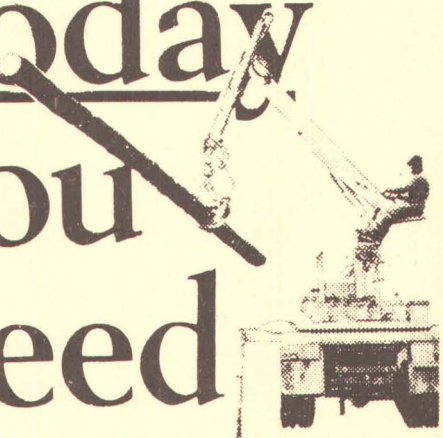
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