



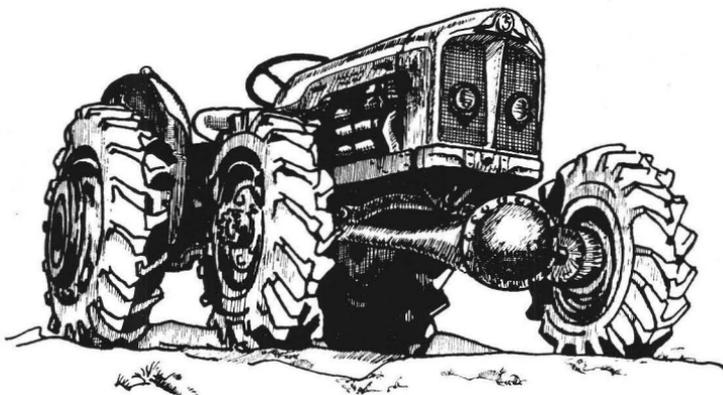
IRISH FORESTRY

Journal of the Society
of Irish Foresters

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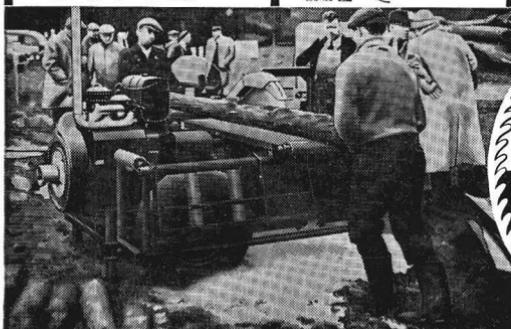
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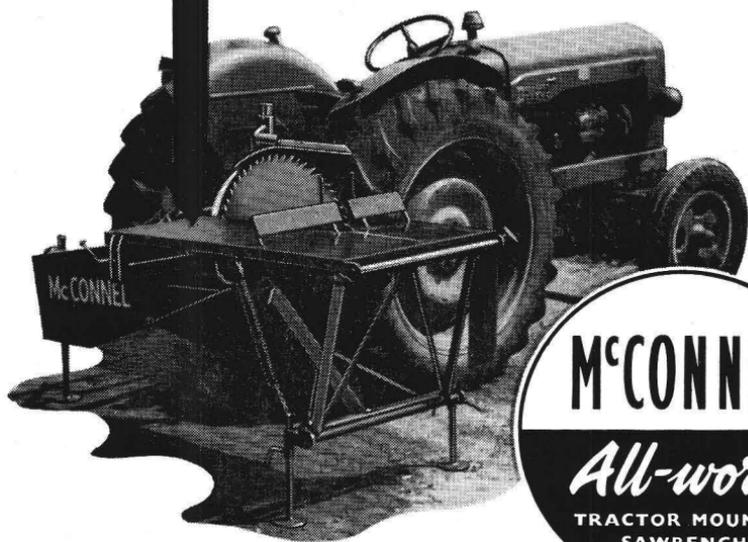
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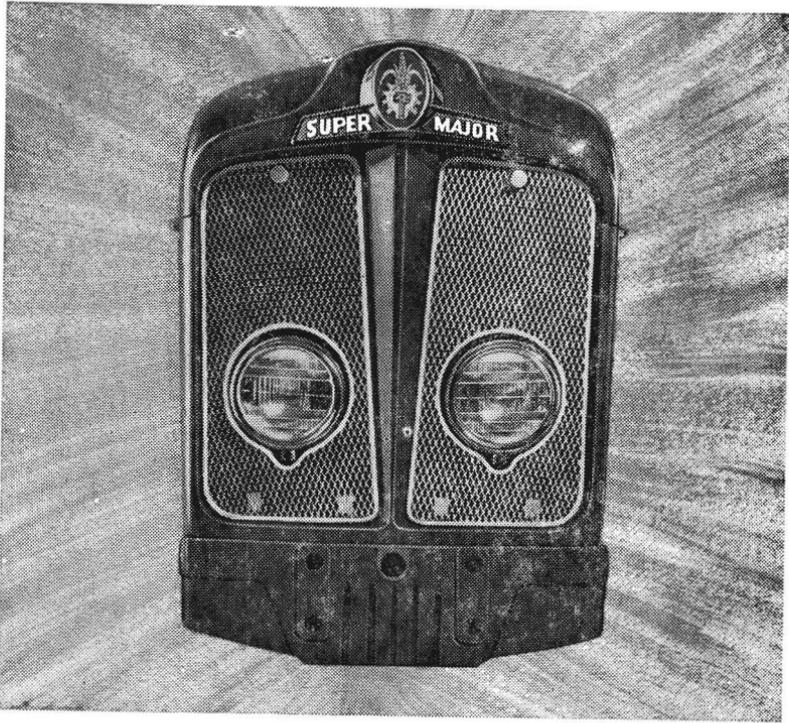


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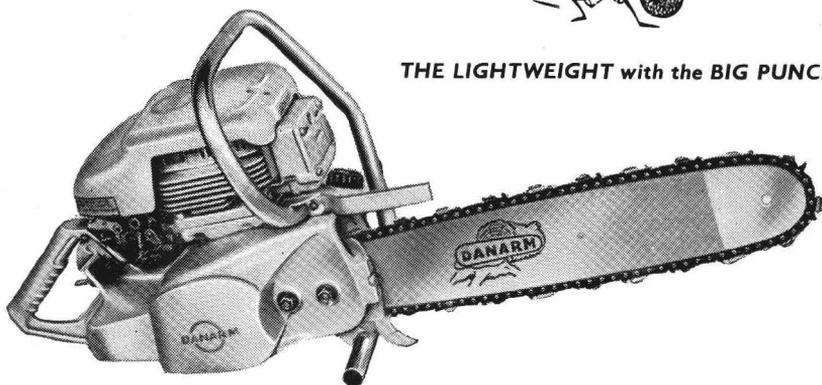
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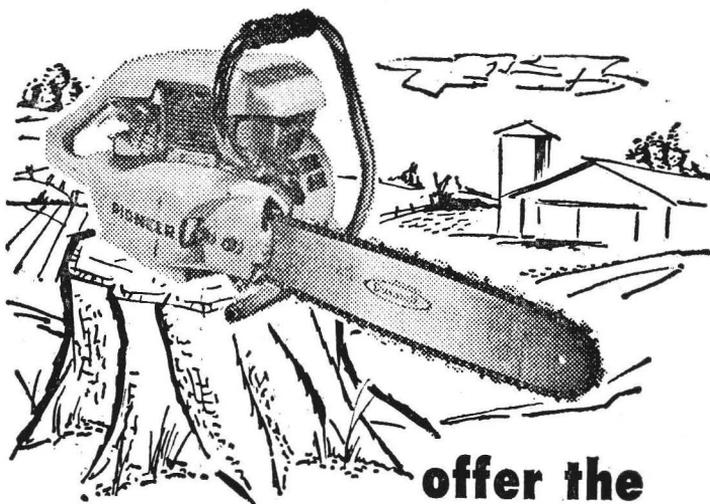
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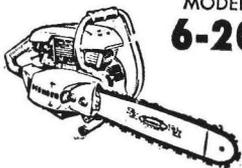
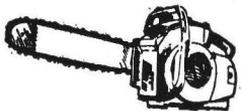
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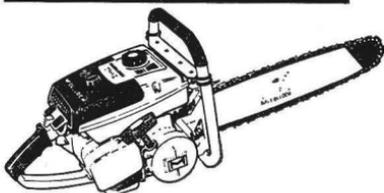
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IRISH FORESTRY

 Volume XXI

Spring 1964

 Number 1

Twenty-first Anniversary Dinner Address*

T. O'BRIEN,

Secretary of the Department of Lands.

IT is a distinct pleasure for me to have the privilege of proposing the toast of the Society of Irish Foresters. Mr. Ó Móráin, the Minister for Lands, would have wished, had circumstances permitted to be present himself, to celebrate with you the Twenty-first Anniversary of the Society and he has asked me, as his representative at this function, to convey to the Society, and to its members, his own cordial good wishes for the continued success of the Society in the attainment of its laudable objectives.

As Secretary of the Department responsible for afforestation in the public and private aspects I too, have an abiding interest in the Society and have observed with pleasure its growth and achievements.

The Society, which draws its members from all the counties of Ireland, was founded in September of 1942 when a group of thirty people interested in the advancement of the knowledge of forestry came together as a Society dedicated to that purpose. It is an item of personal satisfaction that the great majority of those people were members of the staff of the Forestry Division so that the Society may be said to have germinated in our own Department; there can be no question as to the provenance of that seed.

Twenty-one years is in some ways a very long time, yet to many of us round the table here with vivid memories of the period it seems but a small step into the past. In 1942 the world was still at war. There were blackouts at night. All essentials were rationed; the newspapers attenuated. Little maps were scattered freely over those papers on which we learned of strange places like Tobruk and El Alamein. We learned something else in those days. Cut off from our normal supply routes, with our ships involved in the transport of absolute necessities there was little scope for the transportation of quantities of timber; we thus realised the folly of depending on imported timber supplies.

It was in that climate of opinion that the small band of practical idealists came together to form their Society and to determine its objects. I should rather say to determine its object, for the Society has but a single object that being "to advance and spread in Ireland the knowledge of Forestry in all its aspects". At a time when the objects

* This address was delivered by Mr. O'Brien in proposing the toast of "The Society" at the Gresham Hotel on the 16th November, 1963.

clause of most organisations reads like the Memorandum of Association of "Great Universal Stores" it is a tribute to the foresight of its founders and to the restraint of their successors, that the Society's singularly single object remains unchanged after 21 years.

In those twenty-one years the Society has moved to that object with purpose and determination. By 1943 the first issue of "Irish Forestry" the journal of the Society had made its appearance. The journal now reaches every continent and enjoys a high international reputation. It is quoted in technical articles on Forestry all over the world and has contributed seriously to the prestige of this country's technical achievement abroad. For the journal provides a forum for the exposition of ideas and research of the Society's members and of important Forest experts outside that circle and in some cases outside the country. Irish Forestry thus provides a two-way traffic in the spread of ideas.

It is not merely through the pages of the journal that the Society has opened its doors. To permit outside Forestry men to have their say; it has also provided the opportunity for men of international repute to offer their ideas for the benefit of the Society members and through them for the benefit of Irish forestry at large. Mr. Cameron of F.A.O., Dr. Sabroe of Denmark, Herr Oedekoven of Germany, Mr. McDonald of the British Forestry Commission, Mr. Woods of the Timber Development Association and Mr. Hiley of Dartington have all graced the Society's meetings and the late Dr. Anderson, who was a founder member of the Society made one of his few, if not his only, return visit to Ireland to attend one of the Society's General Meetings.

Apart from these visits of distinguished people the Society engages in a number of winter meetings, offering lectures, symposia and general discussions to members throughout the winter months. For a Society such as this the written or spoken word is not enough—as you are people whose interest is in the living trees. It is not surprising, then that from an early date much of the Society's work has taken them out of doors. I understand that their first outing was an epic wartime tour of the Suir Valley, on foot, as befitted the stringency of the times. This gallant undertaking, involving a walk of some 20 miles, of which we may perhaps hear more later, was successfully completed without the help of transport, apart, it is rumoured, from a horse drawn brake which set out from Clonmel in the late evening to rescue a few of the more footsore travellers.

The tour was the precursor of many more, not only to Irish forest areas, but to England, Scotland, Wales, Denmark and Germany. The last named, a tour of the Black Forest area, comprised the largest forestry tour to have visited that country. This is a striking tribute, not only to the Society's organising ability, but to the interest they have engendered in the acquisition of a knowledge of forestry. The Society has also entertained visiting groups of foresters, including the Welsh Forestry Society and quite recently gave their assistance to the Forestry

Division of my Department in organising a tour of foresters from Brittany. A visit by the Scottish Forestry Society is scheduled for next year. Before leaving the Society's specific activities let me mention just one further point. The Society is at present engaged in the preparation for publication of a "Guide to Irish Forestry". I have no doubt that this Guide will be in line with the responsible and authoritative work which we have come to expect from the Society.

While the Society has not sought to influence planting targets or policy nor to campaign for planting private or public, I feel that by their very existence they have contributed to the spectacular strides in forestry in this country during the years since their foundation. I say this, because in my experience, dedicated people of this kind set out with the object of spreading knowledge—and I accept that they do it ably and well—but they do something more. Invariably some of their direct honest enthusiasm rubs off on all who meet them, and inevitably those with whom they talk gain some feeling for afforestation in spite of themselves: nothing is more contagious than enthusiasm. The Society acts as a leaven spreading knowledge and helping to create the climate of opinion in which progress in afforestation on the scale we envisage becomes possible.

I know that everyone here will share with me pride and pleasure in the advances in State Forestry over the period of the Society's life. It is a picture of telling progress. If we take the four five-year periods from 1943 to date we find that State Forest planting was 19,000 acres in the first period, 49,000 acres in the second, 79,000 acres in the third and 124,000 acres in the five year period just ended. This indeed is a vast advance when we consider that at the time our native Government took over there was a mere 3,000 acres of State forest and even at the outbreak of the 1939 war the total area stood at 101,000 acres. Figures of themselves are dead things and rather hard to digest. Let me say then that in the last four years we have planted sufficient trees to form a belt one mile deep along every mile of the Cork-Dublin road. It is true that we must await the full financial impact of planting on this scale, but even in the short term we will soon be reaping a reward in thinnings and to-day we are providing steady and productive employment for 5,000 people in rural areas, much of it in the western counties to which we are looking as a good source of forest land.

Waste land or unemployed land is a calamity and we should not tolerate it. In the general drive and campaign for overall improvement we just cannot afford to neglect any of our resources: it is true that a country can be judged by what it does with its own resources. Ireland undoubtedly has the kind of climate trees like, plenty of rain, a long growing season and freedom from severe winter cold: we should capitalise on that and make it a primary duty to extract from Irish soil and Irish rain and sun and air every available drop of good we can pull out of it. And timber is one of the good things—the demand for timber and timber derivatives is steadily mounting.

By way of comment a forest nursery keeps on reminding me of a Bank—a sort of bank of soil, always at work and regularly earning, with the young trees a most dependable form of investment. It is a common-place to say that money does not grow *on* trees but my own Department and this Society are fully satisfied that money does grow *in* trees.

On the aesthetic side we are transforming the face of the country, putting muscle into hitherto barren areas, and we are not forgetting the amenity aspect. Forest parks will soon be taking shape and every effort is being made to ensure that, in our drive for self-sufficiency in timber, views and prospects of aesthetic value will not be impeded by growing trees: the set ambition is to flatter the landscape, not fight with it. On the private planting side, while we would be glad to see our efforts bear more fruit, it is nonetheless true that the enhanced planting grant coupled with steady propaganda has doubled the private planting rate to 1,000 acres per annum.

There is no doubt that the members of the Society have played their part in these achievements; they certainly have helped to build up a forest consciousness here. I have said before, and I repeat, that the members of the Society are dedicated men aiming at advancing knowledge of forestry in all its aspects in Ireland. I am satisfied that forestry will in the future be one of the really significant assets in our economic advance. I know that the Society of Irish Foresters is one of the dynamic factors contributing to that future.

We pay tribute here to-night to the Society and to that group of thirty people present at its inception—many of whom are still, happily, with us. They don't enjoy the hysteria associated with the "Beatles"—they traffic in more permanent things and command a more lasting confidence. I look forward to many, many anniversaries of the Society and to its continuing and pronounced success in the achievement of its object.

The Irish Timber Trade in the Seventeenth Century

By EILEEN MCCrackEN, M.Sc., Ph.D.

THE purpose of this article is to discuss the use made of standing woods in the seventeenth century in so far as they were directly drawn on for the timber trade and not for the making of iron and glass or for the tanning of leather where their function was simply to supply fuel for smelting or tannin for processing. The Irish timber trade was concerned with articles both for home use and for export but it appears that before the provision trade developed the export trade in timber as timber was the more important. The native timber was used mainly in the making of staves* for barrels, in shipbuilding and in the construction of house frames. The staves were made for the casking of provisions and also for an export commodity in themselves. The ship-building yards produced ships for local service and also for use in the trade with the Far East and the Americas. House frames were used locally but Irish timber also went to help rebuild London after the Great Fire.

One of the inducements used to persuade the English to settle in Ireland at the end of the sixteenth century was the possibilities the exploitation of the woods offered. In a document setting out 'Motives and Reasons' as to why the City of London should undertake the Plantation in Ulster the abundance of wood was stressed: 'All sorts of wood do afford many services for pipe staves, hogshead staves, barrel staves, clapboard staves, wainscot . . .':¹ The making of staves in England was a well established industry and in 1596 their export from either England or Ireland was forbidden as large numbers were being shipped to Spain and other places for the use of 'the enemies of Her Majesty'. During the following year the necessity was stressed of keeping an adequate supply of staves ready for the navy and the Surveyor General for the Victualling of the Navy was instructed to see that quantities of staves were always ready for cask making.

In Ireland the making of staves seems to have been carried out chiefly in three areas: the Bann valley, county Wexford and in parts of the south west. This distribution is in contrast to that of ironworks which were found in virtually all wooded areas. Timber had to be within reasonable distance of a port and as the road system was rudimentary the easiest way of transporting it was by river. In Wexford wood was brought down the Slaney on which in the mid-seventeenth century a hundred men were employed in rafting timber. On the Bann trans-shipment was necessitated by rapids and there were twelve men bringing timber down the river. By the end of the century cotts capable of carrying over 20 tons of wood were used on the Shannon. Large beams were lashed to poles fastened across the cotts. On the south coast

* See glossary at end of article for technical terms.

timber was shipped down the Blackwater and its tributaries although this route was only usable in the summer months. In the middle part of the century staves were being shipped from Kenmare; Spanish ships coming from Galway called to load them as early as the sixteen thirties but even by 1670 the cost of transporting timber to Kenmare from woods only a mile from the river was more than the cost of felling. Wood from the valley of the Glenflesk, which enters Lough Leane at Killarney town, had to be carried on horseback to Castlemain Bay and similarly it was extremely difficult to bring wood from the Carragh valley to the coast. Eventually the wood in these two valleys was used up in ironworks in the latter part of the century.

The chief ports from which timber was exported were Londonderry, Portrush, Coleraine, Carrickfergus, Belfast, Wexford, Ross, Waterford, Youghal, Cork, Kinsale, Kenmare, Castlemain Bay and Limerick. Some smaller ports were also engaged in the trade. For example in 1685 Bristol imported 160 tons of timber from Dingle and 2,500 barrel staves from Killybegs. The countries to which timber and staves were shipped included Scotland, England, Holland, Spain, France, the Canary Islands and Mediterranean ports. Ireland by 1615 sent 30 cargoes of staves annually to the Mediterranean and by 1625 it was said that France and Spain casked all their wine in Irish wood. Scotland was importing wood from the north early in the century, although this trade was prohibited but there was also some importation of pine masts from Scotland for the shipyards at Coleraine.

The exploitation of the woods was well under way by the first decade of the century both in the Bann valley and in south Cork; and the attack on the Shillelagh woods was beginning. By 1601 Sir Walter Raleigh, who had a monopoly for exporting staves, had carried on their manufacture for ten years and in the north staves were being sold in great quantities. In 1611 the Lord Deputy Chichester, requested the Privy Council to send a skilful surveyor to select some woods which could be retained to the crown. 'I find it', he wrote, 'almost impossible to restrain the making and working of the timber into pipe staves without seizing on them when wrought and brought into the port towns which will beget much clamour and offence'. He was upbraided two years later for permitting the woods to be cut and worked into staves, not only by British subjects, but also by 'divers strangers' and he was directed to take steps to preserve the woods and to prevent the export of staves. Bristol, in 1613, imported 32,000 barrel staves, 22,700 hogs-head staves, 8,500 pipe staves and 4 tons of timber. The country of origin is not given in the document concerned but presumably it was Ireland. Partly in an effort to control the export of staves, a licence was granted in 1616 to Henry Milton of Youghal granting him the sole right to make and export staves. Milton abused his monopoly and it was withdrawn from him. There is a record of a transaction between Milton and Richard Boyle, Earl of Cork, in June 1618 whereby the latter paid Milton 6/8 a thousand to export 71,000 staves (13,700 cubic feet). Further attempts at restrictions in 1625 brought renewed protests

from Chichester who asked that permission be granted to export staves to London as the prohibition on export had 'given rise to much complaint among those who had hired ships for the purpose'. Calcott Chambers complained that as a result of the embargo nearly a quarter of a million staves (48,000 c.ft.) were left on his hands.²

Thomas Wentworth, Earl of Strafford, when Lord Deputy, made a determined effort to control the trade in staves by enforcing an export licence of 10/- a thousand and later he raised the cost to £3, arranged for all licences to be granted through himself and fixed the number to be exported annually at half a million. Exemption was however sometimes granted. For example Samuel Neale obtained permission to send 120,000 pipe staves, 40,000 hogshead staves, 30,000 barrel staves and 20,000 pipe headings (37,000 c.ft.) from Wexford to London annually, tax free. Permission was also granted in 1641 for Stafford's agent to export timber from Shillelagh 'for private advantage of the Earl'. One of the charges made against Strafford at his trial was that he exploited the woods for his own advantage.

In 1703, when the greater part of the Irish woods had been cut, the import duty on staves imported from outside of the British Isles was reduced to 1/- a thousand and an additional duty of £3 per thousand was imposed on staves exported from the British Isles. One of the last efforts to prevent the export of staves was made in 1729 by the Trinity Guild of Dublin which urged the government to prohibit the trade entirely.³

It is not possible to estimate, even approximately, the volume of the wood trade. All that can be done is to note the quantities which were sometimes quoted, the custom returns which are available for a few years and the number of workers at some of the sites. It is likely that the men who cut and shaped the timber were often English. As early as 1584 it was urged that 'immigrants . . . and other artificers of timber workers' should be brought over. Certainly in the ironworks the workers were usually English and permission had to be obtained to use Irish labour: at the Mountrath ironworks permission was given to Coote in 1654 to employ 500 Irish workers provided that they lived within musket shot distance of the works. Raleigh employed 200 men in his woods near Youghal and there is evidence which suggests that they were English, making staves which he exported to Spain and the Canaries. A hundred men laboured in the woods of the Lower Bann in 1611. They included 32 fellers, 20 lath tenders, 15 engaged in rafting timber down the river with 9 working the cotts, 9 sawyers, 8 wainmen, 4 timber squarers, 4 shipwrights and 3 overseers. On the Slaney in the 'thirties a hundred men were working transporting timber downstream. Oxen as well as horses were used; 33 were in use in Glenconkeyne (north west of Lough Neagh) and they were also used in Cork. Work was carried on during the summer months; an English buyer in 1670 stated that the maximum amount of timber which could be cut and moved in a single summer to the riverside at Kenmare was 1,000 tons and he also considered that it would be necessary to bring

over English workers. Although sawmills were in use on the continent by the fifteenth century, in England handsawing was general until the eighteenth. An attempt to set up a sawmill near London in 1663 was prevented by handsawyers. In view of this it is interesting to find a patent to set up sawmills in Ireland granted to Sir Hugh Mydleton in 1667. Charles II wrote to the Lord Lieutenant 'We hear that Sir Hugh . . . is anxious to set up windmills in several places for the more speedy, easy and cheaper sawing of timber and boards, a thing not formerly used or known among our people in Ireland. As the setting up and erecting of such mills will cost much money, we authorize you to grant Sir Hugh Mydleton by patent the sole right to set up and use such mills for fourteen years in such places as he shall think convenient.'⁴

It is not possible to say how many staves were exported during the century but there are figures for some years. From the Londonderry woods hundreds of thousands of staves were exported to Spain before 1613. At the trial of the City of London in 1635 an employee declared that he had made 50,000 to 70,000 staves a year since 1618 and the City's cooper estimated that he made 32,000 barrel staves (5,300 c.ft.) a year for fish casks.⁵

TABLE 1.

Exports of timber from Ireland, 1635 to 1691⁷

	1635-40	1641	1665	1669	1682	1691 *
Pipe staves	2,153,650	144,700	45,000	122,000	533,600	1,040,000
Hogshead staves	3,759,450	663,000	229,800	281,000		
Barrel staves		941,000	265,300	634,000		
Timber (tons)		384	191	600	666	
Plank (tons)		209		159	91	
Volume in cubic feet	1,073,000	323,900	100,600	209,500	125,590	185,700

Table 1 gives the quantities of timber and staves officially exported from Ireland during various years of the seventeenth century. In table 2 the various ports and their timber exports to England are given for 1682/3.

TABLE 2.

Export of staves to England, 1682/3.

Wexford	...	182,300	Limerick	...	22,000
Sligo	...	34,400	Dublin	...	19,000
Kinsale	...	29,300	Ross	...	16,300
Baltimore	...	28,000	Waterford	...	13,300
Belfast	...	27,000	Cork	...	13,300

* Exports to England only.

Boyle, who owned a great deal of land in south Cork, including some originally granted to Raleigh, made part of his fortune from the export of staves. In his diaries he recorded transactions involving four million staves (768,000 c. ft.) between 1616 and 1628. The East Indian Company was engaged, among other activities, in exporting staves from Cork for which purpose they 'employed many vessels'.

Although the export of staves was prohibited in 1615, the Company was granted leave to export 'the provision of timber' which they had made in Ireland for casks and ships. In 1636 they commissioned Mr. Stevens to treat for about 4,000 cubic feet of timber annually, or more if obtainable. In 1640, acting on the Lord Lieutenant's warrant, they contracted for 20,000 pipestaves, 50,000 hogshead staves, 50,000 barrel headings and 30,000 barrel staves (56,800 cubic feet of timber). During the same period the navy was experiencing difficulty in obtaining staves: the Lord Deputy informed the Admiralty in 1636 that staves were things which could not be got at once—one had to know beforehand.⁶

By the date 1682, 80 per cent. of the staves which were exported went to England. Of those sent abroad 50,000 went to France from Ross and 24,000 from Limerick; of those sent to Scotland 34,500 were shipped from Belfast. Wexford and Dingle between them accounted for the total export of plank. Wexford also handled just under a third of the timber exports and Dublin just over a third. Of the remaining 240 tons Ross shipped 78 tons, Coleraine 57 tons and Cork 50 tons. The remainder was sent from Baltimore, Belfast, Sligo and Waterford. The overall picture which emerges from these figures is that Wexford was the chief exporting port and Dublin came a rather poor second.

The Navy Commissioners sent Peter Brousdon to Ireland in 1670 to seek out suitable timber for the navy and, initially at any rate, he only considered pieces of over 2 tons weight. He reported in July that there was a Dutch ship lying in Castlemain Bay laden with oak timber from Sir Francis Brewster's estate and bound for Amsterdam but that he could obtain this cargo for the navy if the Commissioners so desired. He narrowly missed securing 300 loads (12,000 c. ft.) of compass and knee timber at Kinsale but was able to load the *St. Jacob* lying at Cork with just under 7,500 cubic feet. The timber of the woods around Bantry Bay he found too small for his purpose but he reported that on Sir William Petty's lands at Kenmare there was over 2,000 tons of 'good serviceable timber for compass timber, knees and standard', as good as any he had seen in Ireland and of which a sixth could be used for planks. Brousdon complained that much of the Cork-Kerry wood has been destroyed by tanners who stripped off the bark for 3 or 4 feet above the ground and left the trees to decay so that they were only fit for staves. Sir William Petty's woods, however, had on the whole escaped the tanners partly because the Kenmare region was so thinly populated that there was little demand for brogue makers. The Shillelagh woods on the Strafford estate he found unfit for his purpose, although still extensive. The timber he described as 'generally straight and large but that which is big enough to make 3 or 4 inch planks is

very much shaken and some full of small worm holes . . . the timber is given so much to defects that I cannot encourage dealing for it'. This comment on the state of the Shillelagh woods is interesting as the previous year (1669) William, Earl of Strafford had sold several hundred thousand staves to a London merchant, and in 1692 ironworks were set up in Shillelagh.

Brousdon also visited the woods in the Bann valley and reported that there were 1,000 loads (40,000 c. ft.) of 'good knee and compass timber with standards and some very good timber for planks and tree nails'. He further commented that 'the timber some of it very large but the most part of it is sizeable for our use . . . we only take what is sound and there is plenty of that . . . I cannot promise that it is generally so strong and tough as our English oak but some is good'.⁹

The trade in timber was related to the provision trade in that until the end of the century goods were casked in Irish wood. The expansion of the provisions trade, which had been carried on on a relatively small scale since the beginning of the century, dates from the mid-sixties when the export of live cattle to England was prohibited to protect the interests of English cattle owners. The effect of this embargo on the Irish trade was disastrous: in 1660, 60,000 live cattle were exported to England and in 1669 the number had fallen to 1,454. Denied an outlet for live cattle the Irish concentrated on exporting salted meat, pork, butter, cheese and tallow. In order to protect and regularise the trade in 1698 it was enacted that provisions were to be exported in casks of 'sound, dry and well seasoned timber' weighing 40 lbs. (10 William c. 11). Thus one can reasonably assume that prior to that date the weight of a cask was in the region of 40 lbs. and indeed they may have been heavier as two of the reasons for the Act were to prevent the use of unseasoned timber and to ensure that the cask was not unduly heavy thus reducing the weight of the contents which was standardised at 2 cwt. The volume of the export trade in certain years is shown in table 3 together with the amount of wood used to cask the provisions.

TABLE 3.
*The provision trade, 1641 to 1691.*¹⁰
(Numbers of barrels)

	1641	1665	1669	1682	1685	1691 *
Beef	15,200	29,200	51,800	79,240	72,200	25,000
Pork		1,250	770	594	2,510	1,000
Butter	17,410	13,200	29,000	68,510	134,700	165
Cheese	6	159	615	2,043		4
Tallow	10,050	10,500	19,100	18,990	20,700	169
Fish	41,610	23,620	30,940	8,440		28,200 †
Volume of wood in c. ft.	59,100	54,500	92,600	124,500	161,100	38,300

* Exports to England only.

† Does not include 900,000 hake.

During the year 9th November, 1654 to 27th October, 1655, Bristol imported the following timber and provisions from Ireland:¹¹
60 barrels of butter and beef;
1,558 barrels of herrings from Wexford;
102 barrels of beef, 124 barrels and 18 firkins of butter from Limerick;
45 barrels, 5 hogshead, 14 cwt. tallow from Kinsale and Limerick;
52,700 staves from Cork, Waterford, Wexford and Youghal;
16 cwt. log wood.

Table 4 shows the results of adding the amount of timber used in the provision trade with the amount exported as staves, etc.

TABLE 4.

Volume of wood exported, 1641 to 1691.
(Figures in cubic feet)

1641	1665	1669	1682	1685*	1691
383,900	155,100	302,100	250,100	161,100	224,000

* Figures for provision trade only.

On the basis of the available figures it appears that approximately between a quarter and a third of a million cubic feet of timber were exported a year. The low figure for 1665 is accounted for partly by the repercussions of the Dutch war on trade with the continent and partly by the fact that the expansion of the provision trade, which followed on the prohibition of export of live cattle, was only beginning. As has been previously indicated the figures for 1691, that is during the Williamite war, are only for exports to England, and those for 1685 are only for the provision trade.

Sufficient evidence is extant to compare the price of timber in different parts of Ireland at various times during the century. On the whole the more accessible timber was dearer but in remote parts the lesser price had to be set against the cost of transport. About 1620 Boyle paid £5 a 100 for big oaks in a wood near Clonakilty. In 1637 he bought a wood from Lord Kilmallock for £1,300 which Boyle estimated would yield 8,000 tons of timber which would fetch between 4/- and 4/6 a ton exclusive of the bark which was worth £400. Sir William Petty, who in 1672 advocated planting 400 million trees in Ireland, quoted timber as worth 10/- a ton in support of his project.¹²

The *Civil Survey* which was undertaken by Sir William Petty in the early 'sixties, gives the value of timber in a few parishes in counties Kildare, Cork and Waterford. The original figures are in Plantation or Irish acres and are only approximate; in table 5 which summarises the information the acreages have been changed into English measure. The general picture which emerges is that in Kildare land carrying ash wood was worth between 113/- and 150/- an acre, and land carrying wood mixed with scrub between 2/6 and 7/6 an acre. In Cork building timber fetched between 8/- and 50/- an acre and land with unspecified

wood from 8/- to 150/- an acre with the bulk of the land around 25/- an acre. The 897 acres in Ballyvourney described as fit for ship-building was valued surprisingly low at 15/6 an acre. There is an explanatory note which reads 'Great store of timber which is of little use as a commodity by reason of the roughness of the ways and of the depth of water and bogs and also the long distances from any traffic or navigable river'.¹³

TABLE 5.

Value of land carrying timber, 1654.

KILDARE

Salt barony

Laraghbryan parish : 2 acres timber wood	...	...	£20
386 acres timber wood mixed with shrubby wood	...	...	£155
42 acres timber wood mixed with shrubby wood	...	...	£40
Straffan parish : 2 acres ash wood	...	...	£18
Killadoon parish : 13 acres ashwood	£100

Narragh & Reban barony

Davidstown parish : 320 acres timber	£100
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Carbury barony

Carrick parish : 3.2 acres ash saplings, £3; 24 acres timber			£30
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CORK

Muskerry barony

Moviddy parish : 48 acres timber wood fit for building	£40
Kilmartin parish : 74 acres timber	...	...	£100
704 acres timber fit for building	...	...	£540
Macroom parish : 48 acres timber	...	...	£130
Aghinagh parish : 960 acres timber wood	...	...	£1,200
Aghabolluge parish : 16 acres timber wood fit for building	...	...	£40
740 acres timber wood	...	...	£760
Inishcarra parish : 4 acres timber wood	...	...	£50
Ballyvourney parish : 896 acres timber wood fit for ship-building	£1,400

WATERFORD

Lismore parish : 400 acres wood	£650
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The timber in regions difficult of access and also the poorer timber in areas engaged in the timber trade was used to make charcoal for the ironworks. Timber was generally cheaper in Ireland than in England and that used in ironworks in England in the mid-seventeenth century cost from 4/- to 7/- a cord (128 cubic feet) whereas in Ireland comparable timber was 1d. a cord on the Shannon, 1/- a cord in the woods near Cork, 6d. a cord in Wicklow and Wexford and 4d. to 10d. a cord in Armagh.¹⁴

Peter Brousdon in his report on the available timber gives the cost both of wood and transport. The actual price of timber was cheaper in the north than in the south but transport was dearer. His findings are summarised in table 6.

TABLE 6.
Cost of timber and transport, 1670.

<i>Kinsale</i>							
1 ton compass and knee timber	...	...	...	...	...	...	18/-
3 ft. treenails, a hundred	...	...	...	...	...	...	48/-
<i>Kenmare</i>							
1 ton timber	...	...	...	...	...	...	5/-
Hewing 1 ton	...	...	...	...	...	...	3/-
Transport to riverside (1 to 2½ miles), per ton	...	...	...	...	...	...	5/-
Sea carriage to England, per ton	...	...	...	...	...	...	30/-
<i>Shillelagh</i>							
1 ton timber	...	...	...	...	...	...	8/6
Felling and squaring 1 ton	...	...	...	...	...	...	2/6
Sawing into planks, per 100 feet	...	...	...	...	...	...	3/-
10 miles land carriage to Enniscorthy, per ton	...	...	...	...	...	...	10/-
Enniscorthy to Wexford, by boat, per ton	...	...	...	...	...	...	2/-
Sea carriage to England, per ton	...	...	...	...	...	...	28/-
<i>Coleraine</i>							
Compass timber, per ton	...	...	...	...	...	...	1/-
Felling and hewing, per ton	...	...	...	...	...	...	2/6
Land carriage to Bann and drawing over rapids, per ton	...	...	...	...	...	...	3/9
Water carriage to Coleraine, per ton	...	...	...	...	...	...	1/8
Land carriage from Coleraine to Derry or Portrush, per ton	...	...	...	...	...	...	2/1
Making of treenails, 2 ft. to 3 ft., per 1,000	...	...	...	...	...	...	2/6
Transport to vessel, per 1,000	...	...	...	...	...	...	4/-
Total cost of treenails, including timber, per 1,000	...	...	...	...	...	...	30/-
Felling, sawing and squaring plank, per 100 feet	...	...	...	...	...	...	20/-
Transport of plank, per 100 feet	...	...	...	...	...	...	20/-

Brousdon asserts that the timber could not be shipped from Coleraine as the estuary did not take ships drawing over eight feet of water. Presumably the navy used larger ships than were general in the coast and cross channel trading. It can be seen that the cost of preparing and moving a ton of compass timber to the coast was ten times the cost of the timber.

At Kenmare timber was cheaper than at Shillelagh but hewing was slightly dearer. Transport costs were lower because the distances were less although relatively the cost was greater at Kenmare as it took 5/- to move a ton of timber 2½ miles there as against 12/- to move a ton

18 miles in Wexford. The preparation of plank timber in Wexford was less expensive than in the north, 5/6 a hundred feet as against 20/-.

Pipestaves in general fetched £6 a thousand in the north and £5 in the south at the ports. It is, however, possible to obtain more about costs in 1620 from the Earl of Cork's diaries. The lowest price which he paid for staves was 32/- a thousand and the highest price at which he sold was £7 a thousand. For hogshhead staves, which were smaller, the price ranged between 32/- a thousand and 54/-. The cost of transporting staves about 15 miles to the coast in Cork was 6/- a thousand.

At Enniscorthy, where most of the wealthy men were said to be timber merchants, the price was £5 per thousand in the 'thirties. By the 'sixties the price had risen to £10 for pipe staves, £4 10s. 0d. for hogshhead staves and £2 10s. 0d. for barrel staves.¹⁵

A certain amount of timber found its way to the shipbuilding yards. In the seventeenth century ports which built ships included Limerick, Cork, Youghal, Ross, Wexford, Belfast, Coleraine and Londonderry. Very little is known about the industry and probably ships were constructed at other ports as well; likewise little is known about the number or size of ships built. For this reason it is of interest to know that in 1676 half of the ships described as 'belonging to Carrickfergus' were Irish built and included one of 120 tons, one of 70 tons, one of 50 tons, five of 40 tons, one of 30 tons, two of 25 tons one of 24 tons and one of 18 tons.¹⁶

Irish wood was used for building ships for the navy and Cork, Youghal, Wexford and Belfast were cited as possible ports where they could be built. Philip Cottingham, a carpenter of London, was sent in 1608 to survey the woods to see which ones contained suitable timber for ships for the navy and he was authorized to employ workmen to hew and square the timber. The following year he was paid £71 3s. 4d. for 'hewing and carriage of timber' in the woods of Waterford. At the same date Chichester suggested that the woods of Shillelagh could be used up in the building of ships at Milford Haven. In 1611, 7,500 trees were marked near Youghal, 3,450 near Cork and 3,250 near Kinsale to be reserved to the crown for the use of the navy. To secure an adequate supply of wood for the navy, after 1621 it was declared illegal to cut timber within 10 miles of any navigable river or the sea. The cutting of woods reserved to the crown was forbidden for any purpose except that of shipbuilding by Charles II but Sir John Bennet in 1668 was granted special permission to take 2,000 tons of timber from the Londonderry woods on condition that he built three vessels of 30 tons each to be used for carrying mail. Drake's ship, *The Golden Hind*, originally *The Pelican*, which was about 100 tons and carried 80 guns, was constructed of ribs 16 inches square set 16 inches apart. The outer and inner planking of the hull were 6 inches and 4 inches thick and the kelsons were shaped out of single pieces of oak 16 inches thick, 6 feet wide and 8 feet long. Although these ships were of negligible size by modern standards, a ship of 100 tons drawing 6 feet of water

was considered the maximum size safe to use in the largely unchartered estuaries of the coast and the majority of ships engaged in the coastal trade and on the Irish sea were of 20 tons. In general it took about 60 to 70 cubic feet of timber to build a ton of shipping.

The East India Company built vessels in Ireland and also exported Irish timber to their yard at Plymouth. They built ships at Limerick and at Downdaniel in Cork. At the former yard the first ship built was fitted with iron from the Drumshambo ironworks. The Downdaniel yard had produced two ships of 500 tons each by 1613 and in that year the dock was enlarged. At Coleraine by 1637 several ships, some of 100 tons, had been launched and ten, all under 30 tons, were then on the stocks. Charles Moncke, the Surveyor General of Customs, alluded to these and marvelled that shipbuilders had 'continued there so long without contradiction, consuming of ship timber, which His Majesty may have occasion to use'. For county Cork there are records of two ships built in Cork and three in Youghal in 1678, of which the larger Cork vessel was of 60 tons and the largest Youghal one 100 tons.¹⁷

With the settlement of English and Scots colonists in Ulster in the early years of the seventeenth century came the introduction of half-timbered houses. Numerous illustrations of these houses can be seen in T. Phillip's *Londonderry and the London Companies*, (1928). Various attempts were made to restrict the use of timber on the Companies' lands to house building and each Planter was allotted 200 'good oaks of several sizes' for building. Some of the wooden houses were quite large. The Earl of Abercorn had erected timber houses near Strabane by 1611 which were 116 feet long and 87 feet wide. The groundsels were oak and the rest of the timber parts were of alder and birch. Chichester put 600 oaks into his houses at Carrickfergus and Belfast and 600 oaks were allotted to Sir Henry O'Neale to build his house at Killyleagh in 1666. Galgorn Castle, built in the seventeenth century, was wainscoted with oak from the woods of Largy and Grange. The parish of Ballyscullion in Glenconkeyne was locally famed for the manufacture of wooden house frames and wooden floors which were sent to other districts.¹⁸

In spite of the export trade in oak and ash during the seventeenth century, the absence of pine woods in Ireland necessitated the import of soft wood. Limerick and Cork were importing Norwegian deal boards in the 'sixties. Sir George Rawdon of Lisburn complained in 1665 that the war with the Dutch was obstructing the trade in deal and had pushed the price of timber up to between 35/- and 45/- a ton in Dublin. In 1682, 204,000 deal boards, 24,000 spars and 200 balks were imported from Norway into Belfast when she was exporting hardwood.

The total import of timber from abroad for 1682/3 is given in table 7. It can be seen that the imports were chiefly of coniferous wood and exotics such as walnut which could not be supplied from the native forests.

TABLE 7.

Timber imports from abroad, 1682/3.

<i>Country of supply</i>	<i>Description</i>
France and Flanders	2,327 ft. walnut plank.
English colonies	720 feet of plank.
Holland	13,400 deals.
Denmark	232,900 deals. 1,530 feet plank. 14,100 spars. 160 pieces wainscot. 110 tons timber.
Scotland	1,470 deals. 237 tons timber.
England	65 tons timber.

The importation of timber increased considerably during the eighteenth century and in 1735, 2,075 tons of timber at £2 a ton, 137,000 barrel staves at 35/- a thousand, 25,000 balks at £20 a hundred, £13,700 worth of deals at £25 a thousand and £1,125 worth of plank were brought into Ireland.¹⁹

It is extremely difficult to translate money values of the seventeenth century into present day values. The seventeenth century was not the twentieth century writ small—the economy was different. Manufactured articles were few and outside of the larger towns the production of food, often of clothes, and the building of cabins was a family affair. Perhaps the best pointer is to be found in labourers' wages; according to Petty they were 4d. a day. It appears possible that ironworkers were paid by production; Petty, for example, paid wages of between 12/- and 13/8 per ton of iron produced, or 10/- if grazing rights and other amenities were granted. Possibly it could be said that the value of money in Charles II reign, exclusive of expensive items such as travelling and purchased clothes, was in the region of ten times its value in 1939.²⁰

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Glossary of terms in text:

Pipe staves: staves each weighing 10.8 lbs. of which 25 are used in a pipe or butt holding 105 Imperial gallons.

Hogshead staves: staves each weighing 9.8 lbs. of which 23 are used in a hogshead holding 52 Imperial gallons.

Barrel staves: staves each weighing 9.3 lbs. of which 21 are used in a barrel holding 32 Imperial gallons.

Pipe, hogshead and barrel headings: pieces of wood forming base and top of casks and weighing 7.4 lbs., 6.7 lbs. and 5.1 lbs. respectively.

- Compass timber : a piece of curved timber used in shipbuilding.
Knee timber : a piece of timber with a pronounced bend used in shipbuilding.
Treenails : cylindrical pieces of wood used to secure the planks of a ship to the timbers.
Wainscot : panneling for the walls of a room.
Clapboards or cleftboards : fan-shaped pieces of wood used for roofing, also called weatherboards.

Notes.

- Life of ships : wooden vessels generally had a working life of 15 to 20 years. Smaller ships lasted longer than larger ones because of the difficulty of seasoning large pieces of timber. Until 1719 the timber was prepared by wetting one side of the plank and charring the other.
Tonnage : in the seventeenth century the tonnage of a ship was not reckoned according to the displacement but from the number of tuns of wine (252 gallons or 40.32 cubic feet) which could be placed in the hold.
Tons burden : weight or measure of any species of merchandise a ship will carry when fit for sea.

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- The following abbreviations are used :
C.S.P.D., *Calendar State Papers Domestic*.
C.S.P.I., *Calendar State Papers Ireland*.
P.R.O.N.I., Public Record Office, Northern Ireland.
U.J.A., *Ulster Journal of Archaeology*.
Lismore papers, *The Lismore papers*, 8 vols., (1880), ed. A. B. Grosart.
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A Tree Improvement Programme for *Pinus contorta*

J. O'DRISCOLL

WITH the necessity for increased production to supply the demands of an ever expanding market all aspects of forest management are being improved. Foremost in this improvement field is the campaign for better seed. The world forestry authorities are conscious of the importance of good seed for it is known that "good seed does not cost, it pays". Conferences have been held, draft schemes and recommendations have been drawn up with the aim of achieving a world wide conception of what is good seed. Having once decided to follow such a scheme it will be possible to guarantee to users that production from better seed will be increased. Good quality seed is, however, of no great value unless the added consideration of correct provenance is also taken into account, this being particularly so for *Pinus contorta*.

In the importation of *Pinus contorta* seed to Ireland over the years many different provenances were bought. They ranged from Bella Coola in British Columbia, a point opposite the lower tip of Queen Charlotte Islands to the Olney region on the north Oregon coast, a range covering 10 degrees of latitude. Inland the range was from Kamloops in B.C. through the states of Montana, Nevada and Utah. This resulted in very variable growth. Those from the interior were not vigorous enough to overcome completely the native vegetation and in addition they retained their natural habit of thin stems and light crowns. Those from the coastal regions, particularly from Washington, proved more suitable to conditions in Ireland; their heavy crown characteristic enabling them to overcome the competing vegetation. In addition they gave a much better volume production per acre.

From these earlier plantings it became apparent that the coastal form was the more suitable for Irish conditions and having this evidence the obvious step was to perpetuate and improve this strain for the production of better seed to cover future growing programmes. This reduced to some extent the necessity for importing further lots of seed from North America. The question could be asked why not return to the parent stand of this good provenance and collect further lots of seed. This can be easily answered: (1) The exact location of these original stands is not known; (2) the previous stand may have long since been felled and (3) if new lots were collected it would take at least another 30 years to prove whether they were suitable for Irish conditions. It would therefore seem pointless to have all this doubt about future lots when proven provenances are already growing excellently here.

The question of how to perpetuate these good stands now arises. There are two methods available, one short term and the second long term. The first is seed stands, a stop gap method which tides one over the period in which seed orchards are being established. Though they

are composed of phenotypically better trees there is no definite guarantee that the seed produced will have improved genetically. This arises partly from the fact that the male parent is not known. However this is overcome, in as far as it is possible, by removal of inferior trees in the stand during thinning operations. It is, however, probable that seed produced in a seed stand is much superior to that produced in a stand not managed for seed production. Seed orchards on the other hand are more under the control of the tree breeder as only trees with superior phenotypic characteristics are represented in it.

Seed Stands:

Firstly a survey of all the potential seed stands is carried out in which 1/10 acre plots are examined. Within each plot the number of potential seed trees is recorded. The result of this sampling places the stand in one of four groups—(a) where at least 75% of the dominants are acceptable as seed trees—this type being designated a Plus Seed Source (b) where more than 50% and up to 75% of the dominants are acceptable—an almost Plus Seed Source (c) where more than 25% and up to 50% of the dominants are acceptable—a Normal Seed Source and (d) where more than 75% of the dominants are not acceptable—a Minus Source (Faulkner 1962). It is recommended that this survey should not be made in very young stands where the trees may not have developed mature characteristics. Depending on the species the result of the survey will vary considerably. In, say, Sitka spruce, many stands would fall into the plus or almost plus category due to the uniformity of the species. Pines, on the other hand, being more variable in form tend to fall into the normal category. Size of the seed stand chosen is also very important for too small an area could be influenced by invasion of foreign pollen from inferior stands close by.

Having chosen the potential seed stand areas, they are managed for seed production by (1) thinning (2) fertilizing and (3) any other ameliorative measures as may be thought necessary. Before thinning is commenced a selection of seed trees is carried out. It is from these selected trees that all future seed collections will be made. Each potential tree is subject to a three point examination

- (1) Vigour and place in the crop;
- (2) Stem form;
- (3) Crown form.

Vigour:

This characteristic immediately makes it eligible for selection or lack of it rejects it. It should be in a dominant position in the canopy. On rare occasions a co-dominant is acceptable if it is exceptional in all other characteristics.

Stem Form:

The stem should be free from all major defects. In very exposed sites the trees may all be leaning so that seed trees may be selected here

which have a slight lean. When eliminating for this characteristic the effects of environment should always be taken into account.

Crown form:

A long narrow type is the ideal here and the selection is based on this standard, care being taken to ensure that they are not too rough or untidy. If a tree has all the required characteristics it is classified as a seed tree. In selecting seed trees reasonable distance should be left between any two selected trees to allow full development of the crown.

When the seed trees have been selected and marked permanently, ameliorative measures are put in hand; the first of these is thinning. The object of thinning is to liberate the crown of the seed tree to allow its fuller development. This liberation of the crown is most important on the southern or sunny side. Following the removal of the competing trees those next to be removed are trees of inferior form which, if left, could be the producers of inferior pollen. These need not necessarily be removed all at once, particularly where there is a danger of wind blow.

During and subsequent to thinning operations every precaution should be taken to reduce the incidence of damage. Felling should be carried out by the forest staff and extracted to ride side so that damage in the form of barking both to stems and roots may be reduced. Creosoting of stumps to prevent, or at least reduce the incidence of *Fomes annosus* is also necessary immediately after felling. Time of felling should be taken into account both to avoid the period of worst storms and the emergence of *Myelophilus piniperda*. If carried out in late winter the danger of the latter may be avoided, as all large timber will have been removed and the lop and top will no longer be sufficiently fresh to attract this beetle.

Following completion of the thinning operation another very important ameliorative operation is that of fertilizing. It has been shown by tree breeders and others that the application of nitrogen, phosphorus and potash increases the fruiting of forest trees. The ratio used in Irish stands is 2N : 1P : 2K (Faulkner 1962) and is used at the rate of $4\frac{1}{2}$ cwts. per acre sulphate of ammonia, $3\frac{3}{4}$ cwts. ground mineral phosphate and 2 cwts. muriate of potash. Ideally an area equal to one and a half times the spread of the crown should be manured around each seed tree. In practice it is spread over the total area of the stand resulting in not only the seed being manured but also non seed trees.

Seed Orchards.

In conjunction with the seed stand programme the establishment of seed orchards can be carried on. This programme is divided into three phases (1) Selection of Plus trees (2) Establishment of the seed orchard and (3) Progeny testing.

Stage 1.

Selection of Plus trees. During the survey of seed stands the selection of plus trees can be carried out. For plus tree selection the examination is much more critical and intensive thus ruling out many

trees that would be suitable as seed trees. In Ireland so far, the examination is based only on the tree's external characteristics, no account being taken of the tree's timber characteristics—ideally these should be taken into account at this stage. However, these tests can be carried out at a later stage.

This examination of the trees is carried out under 4 headings

- (1) Vigour and relative position in the crop;
- (2) Stem form;
- (3) Crown form
- (4) Branch form.

Dealing with each heading in turn will demonstrate the exacting nature of the examination.

Vigour and relative position in the Crop.

This point is taken first since it is by its performance in this category that a tree is considered worthy of examination or not. The question of how to measure vigour is a very controversial one, size alone being considered by many not to be the correct criterion. Lack of competition from neighbouring trees may account for a tree appearing more vigorous than its neighbour. As yet there has been no definite method developed to measure vigour. Consequently the method used for vigour in selection of *Pinus contorta* plus trees is that of size relative to other trees in the stand. Since vigour is relative to the other trees in the stand the standard varies from stand to stand. A tree that appears to be superior in both height and girth growth to its neighbours can be considered suitable for selection. To achieve a standard for each particular stand, the surveyor covers its total area to accustom himself to the potential of the stand. Having set his standard for vigour, a number of potential plus trees are selected on this basis and these are then subjected to a rigorous scrutiny.

Stem form.

To achieve ease of examination each stem is considered under three sub-sections—butt, main stem and upper stem, each of which must be, in as far as it is possible, free from defects. Like the question of vigour, freedom from defects is once again relative to the general conditions in the stand. This does not, however, allow any laxity in standards. Within the butt region the points sought are straightness, freedom from butt swell and freedom from fissures. With *Pinus contorta* many of these points must be examined with a critical eye on local environmental conditions. Most of the *Pinus contorta* stands are on very exposed sites and this fact, plus their very rapid early growth, has resulted in many fine stems having slight to moderate basal sweeps. Where this fact is very prevalent in a stand, a potential plus tree, in which this fault occurs, may be included, provided the fault is not too severe. The presence of butt swell and fissuring will rule a stem out.

Crown form.

This is the next section which is given close scrutiny. Points sought are a long narrow crown which is free from all insect and fungal attacks.

Branch form.

In a species such as *Pinus contorta* this is a very variable characteristic. In the inland provenances branches are usually very light. In some coastal provenances they can be quite light and in others very heavy. Even within any one provenance they are very variable. This holds not only for size but also for number. With a potential plus tree the branches per whorl are first counted and if possible they should be between 5 and 8 in number. Inter-nodal branches are not acceptable. Branch diameter is particularly variable within the coastal provenances. Consequently in dealing with this point the general branch diameter pattern should be taken into consideration. Lighter branches are preferable. There is no definite upper limit but consistently heavy branching will rule out a vigorous tree. Another very important point is the angle formed by the branch with the stem. This is also extremely variable. In some cases it may be a right angle while at the other extreme it may be nearer to 30° . The importance of angle is such that it governs the length of knot included in the wood, the steeper the angle the greater the length of knot. What is sought therefore is as near a flat angle as possible. In *Pinus contorta* an added disadvantage to steeply ascending branches is the tendency for the bark to grow out around the branch; this leads to the inclusion of pockets of bark in the wood.

The question then arises whether it would be better to adopt a system for scoring each characteristic. Difficulty would then arise as to the best method and if it were not weighted it might lead to some trees getting a high score on less important characteristics. This would lead to trees with more desirable characteristics but with lower scores being ruled out. On the other hand with the non-scoring method, personal bias may enter into one's considerations. Since a satisfactory scoring system has not been developed all selection is carried out on a visual basis.

Stage 2.

Following on the selection of plus trees the next step is the establishment of seed orchards. Before the actual laying out of the orchard it is important to plan the size required. The size should be sufficient to allow the production of a specified quantity of seed. The area required will in all probability be greater than is available at any one site. Therefore the area required will be divided over a number of sites each containing material from all the plus trees. This stage of the programme can also be broken into a number of stages (1) selection of site, (2) preparation of site (3) layout of area and (4) grafting.

The selection of a suitable site is most important. The points looked for are fertility, southerly aspect and isolation from any plantations of the same species.

A southerly aspect is stipulated to ensure that the site has the maximum amount of sunlight and the minimum amount of frost. In this country those sites facing any of the southern points of the compass are classified as being suitable. Isolation from plantations of the same species is to ensure that no contamination can occur from foreign pollen. Where there are wide geographic ranges it is of importance to have the orchards in the same regions from which their constituents were collected.

Following the selection of the site, ground preparation is undertaken. At present opinions vary as to which is the best seed orchard floor. There are two possibilities, that of leaving the area fallow or of sowing it with a special grass clover mixture. The former ensures that there is no competition between the ground vegetation and the grafts. However management of such a site is very difficult particularly in a wet climate where difficult underfoot conditions are liable to prevail. In addition, the site would have to be continually rotovated to control new growth. During rotovating there is the danger of the roots of the trees being damaged but this could be overcome by leaving a small area immediately around each tree unrotovated. The alternative, of ploughing the site and sowing with a permanent grass clover mixture, appears most suitable for Irish conditions. Prior to planting of the orchard the erection of a proper rabbit and stock proof fence is essential. At this stage the layout of the future orchard can be marked out on the ground. The distance between grafts is initially 15 ft. and between rows 15 ft. and, depending on the size of the area available, the orchard can contain anything from 400 grafts upwards. The exact location of each tree is first marked on the ground and then an area one yard square is dug over. During the cutting of the sward the dug over areas are mulched with some of the cuttings and are then left unplanted for some time. The stocks may be placed *in situ* prior to grafting or placed there at a later date following grafting but normally grafting is done away from the orchard site, the grafted stocks being brought to the seed orchard site after they have struck.

Scion Collection:

This can be carried out by either of two methods, climbing the tree or shooting. The former is a slow time-consuming job which entails the transportation of bulky equipment and the delay in setting it up. For shooting, on the other hand, all that is required is a shot-gun. The cartridges are of a special type, having 6 large pellets in each. A branch with suitable scion material is selected with the aid of binoculars. It is then shot down severing the branch as close to the stem as required. Position of the selected branch in the crown depends on the prevalence of male flowering shoots. In many cases the middle third of the crown is almost completely male and consequently many of the branches selected have to be in the lower third. The upper crown usually does not possess a branch with sufficient scions on it and in addition many of the available shoots are also male. The upper crown shoots also

tend to be rather vigorous and in many cases are much stronger than the available stocks on to which they will be grafted. The scions are cut from the fallen branch using a secateurs and are usually about 6 ins. in length. During the selection of the scions care is exercised to ensure that no shoots with male buds are included in the selection. The presence of male buds is recognised by a swelling on the basal portion of the bud. Those shoots which have borne male flowers are also unsuited as scion material. Those selected are in every case the most vigorous on the branch selected. Following collection the scions are placed in polythene bags and loosely tied. All these operations must be carried out when the bud is in the dormant state.

Grafting:

Grafting follows next but is usually at a later date to that of scion collection if it is carried out in the open. If it is indoors the collection of the scions can be synchronised with the commencement of growth of the potted stocks in the greenhouse. Stocks are those plants on to which the scion shoot of the plus tree is grafted. These are usually 2 + 1 or 2 + 2 transplants of the same species which have good form and are of vigorous growth. It is essential, particularly with *Pinus contorta*, that the stocks be from the same provenances as that of the plus trees. Before grafting these stocks must be undisturbed for at least one growing season. For open air grafting this is usually in transplant lines at a wider spacing than normal between the plants. For greenhouse work the plants are potted the Spring before grafting is to be carried out. The potting medium is a mixture 7 parts of loam, 3 parts of peat and 2 parts of sand (Lightly and Faulkner 1963). To this also is added some compound fertilizer. The potted stocks are left in the open until the following winter when they are placed in a greenhouse and subjected to higher temperatures to induce early growth. The temperature may be raised by either soil or space heating or both. In this way the grafting season may be extended over a longer period thus increasing the output. Once the stock has commenced growth the dormant scion is grafted on to it using the side veneer graft. The grafted stock is allowed to remain in the glass house for some time to permit the proper union of scion and stock. In mid summer it is placed in the open still in the pot, but is not planted out in the orchard until the following autumn. Correct and careful labelling must at all times be carried out during this phase of operations. Prior to the final laying out of the orchard the exact location of each scion with the correct identity tag is marked on the ground. The potted grafted stocks are transported to the orchard site where they are carefully removed, care being taken not to injure the roots. Greenhouse grafting usually give a much higher proportion of successful grafts than outdoor grafting.

Lay out:

The size of orchards varies considerably, but it is believed that one should contain not less than 20 clones, a clone being material grafted

from a particular plus tree. Too small an orchard is undesirable as inbreeding is liable to occur thus leading to a decrease in vigour. The layout is usually square but it can be any other shape depending on the size of the area available. Its size is normally designated by the number of clones represented in it. A 20 clonal seed orchard is one having 20 rows and 20 grafts each row having a representative of each plus tree in it. The layout is such that somewhere within this square each graft is along side every other graft represented in the orchard. The initial spacing of 15 ft. \times 15 ft. is to ensure that in the early life of the orchard sufficient pollen will be produced to fertilize the female flowers. When the grafted stocks have reached full development every second tree will be removed thus giving the required spacing of 30 \times 30 ft.

Stage 3.

The final proof of whether the plus trees selected are of superior potential comes from progeny tests. If they should be shown to be inferior their representatives in the seed orchard must be removed. The simplest form of progeny testing that can be carried out is the one parent test. Here seed is collected from the parent plus trees and sown in the nursery. The resultant development of the seedling can be watched and any inferior characteristics noted. There is however, one big draw-back to drawing conclusions from this test and that is that only one parent is known. The more reliable form of test is where controlled pollination is carried out in the orchard. The procedure followed is to collect pollen from a number of clones represented in the orchard and with it pollinate the developing female flowers. During this operation great care is taken to ensure no foreign pollen is allowed to enter and pollinate the flowers. Each flower is protected by a bag made from a weather proof material. It is placed over the flower some-time in advance of its being receptive to pollen. At the correct time the pollen is injected into the bag in a cloud, some of which fertilizes the ovules. When the seed has developed fully it is collected and sown. These progenies are observed carefully and any lack of vigour or other bad characteristics are noted. These characteristics can be related back to their original parents. These trees are then removed from the orchard at the first thinning. In this way only those trees of proven characteristics remain in the orchard and subsequent seed produced can therefore be classified as genetically superior.

The area of seed orchards will depend on the annual requirements of *Pinus contorta* seed and the expected seed yield per acre of this species. In the case of seed stands the annual yield is estimated at about 10 lbs. per acre. At present our annual requirements range from 400 lbs. to 600 lbs. To supply this demand would require an acreage of 1,500 acres, this figure being increased to allow for the periodicity of seed years. The quantity of seed produced in an orchard is not as yet known for *Pinus contorta*. For *Pinus sylvestris* a yield of 10-15 lbs. per acre has been estimated abroad. The advantages of the seed orchard

is the case with which collection can be made and most of all the fact that the seed produced can eventually be guaranteed to be of superior quality.

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A Review of the First Five Year's Work of the Home-Grown Timber Research Committee

The Forest Products Research Laboratory/Forestry Commission.

SINCE the Forest Products Research Laboratory was founded nearly 40 years ago to study the science and technology of timber, its programme of research has always included the study of home-grown timbers. The importance of close co-operation between those who study timber and those who grow and market it has always been recognised. The Forestry Commission, with its own planting programme and with responsibilities towards the private woodland owner also, has had a special interest in the work of the Laboratory and liaison between the two has always existed officially and through informal personal contact between individual research workers.

In 1958 a re-orientation of the Laboratory's programme enabled a larger proportion of its research effort to be devoted to home-grown timbers and it was decided in view of this to form a Committee with special responsibility for co-ordination of work in this field. The Committee was instructed to keep under review all the joint work of the Laboratory and the Commission, to consider proposals for new research projects, to arrange for the requisite liaison, and to make recommendations to the Directors of the Forest Products Research Laboratory and the Research Branch of the Forestry Commission. The Committee, having members who are directly concerned with utilisation or research in forestry or timber technology, has proved a useful forum where investigations can be planned, results can be discussed, and the relative importance and urgency of various alternative research projects can be assessed.

The aim of the investigations has been to provide the technical data which are needed in the formulation of forestry policy and in the utilisation of the timber which is produced. A major aim of forestry policy is to secure the best return from any given site, and whilst the

forester's choice of tree to be planted is limited by what will grow well under local conditions, it is obviously important also to have adequate information on the relative merits of timber of various species and the effects of silvicultural treatment on timber quality. Optimum utilisation also calls for technical information about timber quality and yield and may require in addition data on conversion and processing. With the Forestry Commission's increasing output of timber, this aspect of the Laboratory's work is becoming more important.

In its first five years the Committee has had twenty meetings and has considered more than one hundred papers. The research under review falls into three main categories. The first of these comprises investigations into the basic properties and utilisation of specific timbers. These include anatomical, chemical and physical properties, seasoning properties, strength, working properties, resistance to fungus and insect attack, and reaction to preservative treatment. Conversion and grading studies have also been carried out and the inter-relations of provenance, growth conditions, silvicultural treatment and technical properties have been investigated.

The first species investigated was Sitka spruce, the most widely planted exotic forest tree in Britain. Representative material from a wide range of sites was examined and the results were published in Forest Products Research Bulletin No. 48 "Properties of 30-37 year old Sitka Spruce Timber". Other species which have been the subject of investigation on a large scale since the Committee was formed are lodgepole pine, European larch, and Japanese larch (with limited tests on hybrid larch) and work has started on Norway spruce. Material for these general investigations has been obtained by sampling sites in different parts of the country, chosen so as to take into account the principal factors believed to influence the properties of the timber. Investigations on a smaller scale, aimed at assessing suitability for planting in this country, have been carried out on certain species of minor importance such as Turkey oak, red oak, *Pinus holfordiana*, *Abies grandis*, and *Metasequoia*. An investigation of *Pinus strobus* is under way.

In the second category are special investigations of the particular characteristics of a species, for example the relation between the characters of bark and wood in birch, the peeling properties of poplar, the gluing characteristics of Scots pine, the conversion and seasoning properties of Forest of Dean oak, and the pulping characteristics of home-grown softwoods.

Projects in the third category are concerned with home-grown timbers in general. These have covered a wide range of subjects. The pattern of variation in wood structure within the tree has been and is still being studied, not only to extend our knowledge of wood anatomy but also to minimise the number of samples needed to assess the properties of a given species. The moisture content and specific gravity of freshly felled conifers have been measured on a wide statistical basis primarily to provide data of use in marketing. Methods have been

developed for evaluating timber quality in standing trees; these are of special interest where the tree is required for breeding purposes. Other projects have been concerned with the strength of home-grown pit-props, sawmilling problems, seasoning and preservation techniques, the control of fungi and insects attacking timber, and the use of home-grown timber in structures. A study of the effect of thinning treatment and pruning on timber quality is in hand, and tests of the suitability of home-grown softwoods and hardwoods for plywood manufacture are about to begin.

It will be seen that some of the investigations are of an exploratory nature, preliminary to the planning of productive research, some are yielding results which influence the planting programme, where the economic benefits will be felt many years ahead, and some are yielding results of immediate value in pointing the way to improvements in forestry practice or timber utilisation. The underlying purpose of the whole research programme is to improve the quality of home-grown timber by selection, breeding and silvicultural treatment, and to make timber production more profitable by helping to develop better methods of conversion and processing. The progress of the work has been recorded in the Laboratory's Annual Reports, and the results of completed investigations may be found in official publications issued by H.M. Stationery Office and in forestry and timber journals. A selection of relevant titles is appended.

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Society's Activities

Twenty-first Anniversary Dinner of the Society

THE twenty-first Anniversary Dinner of the Society was held in the Gresham Hotel on Saturday, 16th November. It was presided over by the President of the Society, Mr. Michael McNamara. The guests of honour for the night were The Minister for External Affairs, Mr. Aiken and Mrs. Aiken, and, representing the Minister for Lands, the Secretary of the Department of Lands, Commissioner Timothy O'Brien and Mrs. O'Brien. Other distinguished guest were Mr. K. F. Parkin, Chief Forest Officer for Northern Ireland, Mr. S. M. O'Sullivan and Mr. T. Manning, Inspectors General, Forestry Division. Mr. C. S. Kilpatrick, Deputy Chief Forest Officer, Northern Ireland, Mr. H. Harbourne, Trees for Ireland and Mr. D. Craig, Honorary Auditor for the Society.

After an excellent dinner, the President, Mr. McNamara, called on Mr. Aiken to propose the toast "Forestry in Ireland". Mr. Aiken in his speech said that 40 years ago there was only 3,000 acres of State forests in the Republic. Today the acreage was 400,000 and there was more than 120,000 acres of State owned forest in Northern Ireland.

Because of the problem of getting land, Mr. Aiken continued, our planting rate of 25,000 acres was not likely to be increased. For that reason he thought farmers should be encouraged more and more to avail of the generous grants for private planting. He considered that the daily newspapers could give a better coverage to forest topics and radio and television could all play their part.

He ended his speech by referring to our rising forest industry; the State Forest Service, the private planter and the timber merchants. He said "These are the components which are working together to create a great Irish Industry and I salute all these sectors in offering to you this toast of Forestry in Ireland."

The text of Mr. T. O'Brien's speech appears on page three.

Mr. McNamara, the President, in reply to Mr. O'Brien's speech, said that the Society was formed twenty-one years ago to advance the knowledge of Forestry in all its aspects and in pursuance of this objective they had been listeners to many distinguished lecturers. They had visited woods and forests here in Ireland, in Great Britain and on the Continent of Europe. They went out to see trees growing. They saw trees that were growing well and trees that were not growing so well and they asked themselves why? They argued and compared knowledge and experiences, they listened and learned and were the richer for it all in their understanding of the problems that confronted them in their everyday work.

During its life the Society had seen many changes in techniques and developments. The advent of the plough, techniques of fertilization and the improvement of provenances had made it possible to grow satisfactory tree crops on land which was previously regarded as barren and unproductive. Following up these developments tended towards specialization and the dissemination of this specialist knowledge was a work of great importance and it was possibly in this field that the Society might play its most important role in the future.

He said he wished to thank the Minister for Land and his officers in the Forestry Division for the many courtesies extended to them during the years. Without this co-operation it would not have been possible for them to carry on their work. To the Minister for Agriculture of Northern Ireland and his officers he would also say a very sincere thank you for making them welcome on the many occasions they visited forests in Northern Ireland. Finally to all those who had helped them in their work during the years he would like to express the gratitude of the Society.

An event of the evening was the presentation of a suite of Waterford Glass to Professor Clear as a recognition of the work and service he had rendered to the Society down the years since its foundation.

Mr. Sean O'Sullivan, presenting the suite, said that it gave him much pleasure to make this presentation on behalf of the members of the Society. He said he had known Professor Clear for thirty-three years, when they started their studies in University College together, and he went on to trace the Professor's career from their university days to the present time. He referred in particular to the Professor's work as Secretary and Treasurer to the Society and paid tribute to Mrs. Clear whose capable assistance helped to ease the burdens of these offices.

He also mentioned Professor Clear's many writings for the Journal of the Society. And he ended by quoting from an article Professor Clear wrote in the first journal printed. The article "The Thinning of young Conifer Stands" ended thus "Let us keep to sound thinning principles and have patience, about returns. The forester will eventually be judged by the trees he has left, not by those he has removed. So let us hope the woods of the future will be monuments to the present generation of pioneer foresters". Mr. O'Sullivan said that he chose these words because, first, as a forester, he thoroughly agreed with them and all foresters should never tire of preaching them. He chose them secondly as they served as a fitting allegory to the Professor's work for the Society and he gave his version of the quotation, "The man will be judged by what he has left to this Society, not by what he has removed. He took nothing but unwittingly leaves a monument to himself for the present generation of Irish Foresters."

Professor Clear in reply expressed his profound gratitude to the Society for the gesture. He said that he was deeply pleased that his association with the Society should be so appreciated. He also expressed pleasure that the representative of the Society for the occasion should

be Mr. O'Sullivan, an old friend, who had shared with him many of the experiences and pleasures of forestry. He thanked the Society on behalf of Mrs. Clear, who had been a mainstay in helping with the onerous clerical duties that this office entailed. He said that he did not intend to speak at length, but he felt that he must refer to the excellent record of the Society in the achievement of its aims. He congratulated it and its members and expressed a hearty wish for its long and fruitful life.

Illustrated Lecture in Dublin

A highly interesting, though off-beat meeting was held in the Shelbourne Hotel on the 14th December.

Dr. Joseph Raftery, Keeper of Antiquities in the National Museum, gave a talk to the Society on Archaeology. Having been introduced by Mr. M. McNamara, Dr. Raftery told us that the forest had a very significant effect on the lives and habits of the early inhabitants of Europe and Ireland. Four to five thousand years ago man was confined to the river valleys and Europe was divided north and south by the vast trackless forest that comprised Central Europe.

Ireland was a half-way house on the sea routes and so participated in the trade and culture of Europe. The paleobotanists tell us that Ireland was mixed dense forest up to comparatively recent times and movement was along river valleys, sea-routes and above the tree line. The first inhabitants of Ireland came over dry land from north-west France about 9000 B.C. and the pre-Christian population has been estimated at perhaps a half million.

Dr. Raftery showed us a number of slides depicting ring-forts, cromlechs, standing-stones, burial-mounds and other aspects of life on this island over 2,000 years ago. From the birth of Christ onwards the forest came more into prominence as a supplier of raw materials. Wooden ploughs drawn by oxen were used—vessels and shields were made from timber and of course timber was used for building purposes and dug-out canoes were common. Yew wood was used for vessels and other small objects at this time as the art of pottery had been lost. A most interesting series of slides were those showing musical instruments and other objects of relaxation used by the early Irish.

As major users of the countryside, Dr. Raftery asked us for our co-operation in the preservation of things of the past. He suggested that we should combine the monuments of the past with the amenity of the present.

A short question time was, then held—Mr. T. McEvoy, Mr. N. Morris, and Dr. N. Murray, *inter alia*, contributing. Mr. McNamara then thanked Dr. Raftery for kindly coming along and then closed the proceedings.

L. O'F.

Meeting at Omagh

MEMBERS met at the Royal Arms Hotel, Omagh on Saturday, 29th February. The meeting consisted of three phases. Two indoor discussions on Saturday night, and a field day on Sunday morning.

At 5 o'clock a symposium, "Looking Ahead", was contributed by Mr. R. Busby, Northern Ireland Forest Service, Mr. S. Campbell, Irish Forest Products Ltd., and Professor Clear, University College, Dublin.

Mr. Busby speaking on the theme of "Present Silviculture and Management in Relation to Future Requirements" said, "to examine the role of the silviculturist in the past gives a basis upon which to assess the future of this science in the changing conditions likely to occur. Up to 40 years ago, the silviculturist was undoubtedly the hub of traditional forestry. He was something of a soil expert, entomologist and pathologist, while simultaneously he applied natural laws in his treatment of the forest. He knew his trees and his forest and the more he knew the greater were his refinements, the ultimate being those delightful stem by stem selection forests of spruce, fir and beech in the central mountains of Europe. Here, on what would be a relatively poor site, if cleared of trees, he has had and is obtaining high annual yields of high quality produce.

Then the economist appears. He wants capital. Within a range of growing stock volumes, the increment remains unaffected but with a reduced growing stock the increment per cent. is increased obviously. The excess of growing stock is felled to provide capital which is invested elsewhere, to gain more return than the wood is capable of yielding. Growing stock level, thinnings and rotations are calculated so as to obtain the maximum financial return upon the investment. The old instinctive silviculture has to go, replaced by hard thinking and compound interest.

An F.A.O. estimate of consumption of timber in Europe by the end of this century was 16,000 million H. ft. compared with the 1960 consumption of 6,000 million. It is reckoned that with improved management and techniques, Europe can supply 8,000 million H. ft. for herself, leaving 8,000 million to be imported. This is of significance for the following reason. The economic return of the timber industry is in the processing, not in the growing, of timber. Using Swedish figures, the forest can yield 3% on invested capital. Pulping, paper and paper products yield about 17% return. Thus, countries exporting raw timber are losing the profitable part of the enterprise, and it is logical to assume that there will be an increasing reluctance to export unprocessed material. This will lead to an eventual shortage of timber in its traditional form, with a corresponding increase in price. It is unlikely that this will be reflected back to the timber producer in increased return for this category, but rather will the increased price speed the substitution of other materials in place of wood according to the trends which have become obvious over the past decade. In contrast,

the industries which are based upon the chemical or physical properties of broken down wood seem to have a clear field ahead as far as can be seen, especially the pulp and paper industry. This seems a good investment, but the processing must be carried out in the country where the timber is grown in order to obtain the maximum benefit.

The supply of the maximum quantity of this pulpwood material is thus the challenge to our management, in combination with the economic considerations already discussed. Production cost must be kept to a minimum. Management units will have to be large by grouping existing forests. Yield may even be controlled over a number of management units grouped into a productivity unit. Labour should be highly mobile. In other words, management must be extensive as any intensive management will immediately increase cost, and hence reduce potential return.

How does our management stand in relation to these requirements? We make management plans for small solitary forests. The silvicultural maxims which are used are traditional. Are we managing woodlands to cater for conditions which have disappeared or are fast moving in that direction? Will a normal growing stock on a forest of a 1,000 acres and a variety of species up to 11 inches B.H.Q.G. mean much about the year 2000?

Does the modern forester need to be a silviculturalist to have the feel of the forest, or does he need to channel his skills into other more modern managerial requirements—work study, organisation and labour relations? On the technical side of his business he has experts who can give him the necessary information about how to grow his forest. Specialists can provide him with the mensurational data necessary. The economist can tell him the rotation, the soil scientist—how to treat the soil, the plant physiologists—the exact requirements of a species and the tree breeders—the potential of a variety or clone within a species; and so on.

Is our forestry taking advantage of these conditions which exist for its economic development, looking towards the future requirements which will be demanded of it? Let us consider particular instances from present practice.

Concerned as we have been with afforestation, choice of species is an ever present problem. It is difficult to say how far monoculture can be taken, but it can be said that plantings which produce a stock map of a kaleidoscope of species and mixtures will not meet future requirements as we have forecast them. How about hardwoods? Will there be a demand for any hardwood unless it is of veneer quality, and if not, can veneer quality oak, for example, be grown in this country, or will it pay? We cannot be sure of the answer to these questions but we do know that where one can grow oak there also can be grown highly productive Norway spruce with a fairly sure financial return. Again the result of selective tree breeding, soil analysis and continued work on plant physiology could have a revolutionising effect upon choice of tree species, spacing, fertilization, etc.

Thinning is being looked at in an increasingly critical light, and in fact, certain areas have already been designated, be it tentatively, as "no thinning" areas. The advantages are—low road cost, low maintenance costs, low felling costs—compared with expensive roading and extraction, higher maintenance but early intermediate yield to offset capital investment and so reduce interest charges. It is by no means a clear cut decision; total production may not suffer and stability may not be affected, in fact, may even be improved. Again, do thinning yields always pay for the cost of the operation? These considerations help to put the choice—thinning or no thinning—into perspective. Contrary to traditional thought, no thinning in certain circumstances may well be the best choice.

Again, is too much time wasted on worrying about "how to thin" instead of "how much to remove" in a thinning. The new F.C. Management Tables should help to correct this, but many people still hold to the old conviction and waste time debating the relative merits of low thinning v. crown thinning, etc. As the important aspect in thinning is the quantity to be removed, the most economic way of removing the required volume should be chosen. This may well be by automatic numerical selection.

When considering future requirements I have been concerned only with wood as a raw material. There is, however, a social and recreational requirement which cannot be ignored, especially as parts of our country become increasingly urbanised and industrialised. We are dependant upon the politicians for the grant to forestry and if we are to sacrifice economic considerations for these nebulous, though important factors, we should make it clear to them exactly what we are losing. It should not be too difficult to achieve a happy marriage by setting aside certain areas and managing them for recreation, with production secondary, and distinct from the serious business of providing a raw material which will be, we hope, much desired and of value to our country in the future."

Mr. Campbell in his speech said that the concept of the multiple use of forestry was agreed by all, but when planning for the future the primary objective must be defined and in this country, such objective will be and must be the production of wood products. This being then the main objective, forestry becomes very much an industry. There would seem to be a growing awareness of this and this awareness will increase as the area of our plantations at the harvesting stage increases, reflecting the great potential benefit it can present to the structure of our national economy.

The speaker went on to say that before attempting to look ahead and anticipate the probable future scope or pattern of forest industries here, a brief glance at present day forest utilisation activities must surely be of benefit. Posing the question, he asked, here in Ireland, was the timber trade measuring up to taking its place in a major integrated forest industry and was it showing signs of keeping pace with the efforts of the growers in that it was absorbing the timber becoming

available from the forests? In answer he told us that five factories designed to use forest thinnings were in production in Ireland. Their combined weekly intake was approximately 100,000 hoppus feet. This intake represented the equivalent of the thinnings from an area of 15,000 acres of quality class III Sitka spruce at twenty-five years old. Whereas in the general overall sense, spruce appeared to be the main choice, the major coniferous species were generally acceptable and there was a limited outlet for contorta pine, providing it was of good quality. Thus, relatively speaking, the pulp and allied wood industries in Ireland had over the past fifteen years or so grown quite considerably.

He stressed the fact that over the past number of years, despite rising costs, the Trade had, so far, succeeded in meeting an increased standing price for the thinnings, thus benefiting the growers and reflecting the Trade's capacity for efficiency in operation.

He said that our production forests were of little use, if we have not the markets for their produce and in "looking ahead" the sober realisation of the need for an efficiently run, aggressive industry is paramount.

The speaker in referring to the native sawmilling industry, mentioned that it was steadily improving in its ability to meet demand for sawn timber of high quality, but that, at the moment, the lack of a sufficient and sure supply of suitable sawlogs was a major factor limiting desirable development in scope. On the question of minimum dimensions of sawlogs, he expressed the opinion that in "looking ahead" for the general benefit of the forestry industry here and in avoiding wasteful conversion, which would impair the efficiency of our sawmilling trade, a minimum of 8" B.H.Q.G. seemed desirable.

He referred to the fact that in the case of sawn timber production, wood costs represented $\frac{1}{2}$ to $\frac{3}{4}$ of total production costs and this meant that they had a dominant influence on total costs.

The prospects of future markets looked good, as it seemed, he said, a reasonable assumption, providing we were competitive in both price and quality, that as soon as suitable raw material became available from our forests in sufficient quantities, our native wood could win the existing market in this country for imported wood, which market has a value, that runs into millions of pounds annually. When "looking ahead", the possibility of exports in the future should not be overlooked and there would seem to be strong evidence of a future export market to both Britain and Continental Europe.

Mr. Campbell finished on an optimistic note—that with efficiency at both the producer and processor levels, the future for forestry seemed bright.

Professor Clear also spoke to the theme.*

Following some questions the party adjourned for supper.

* Professor Clear's paper does not appear in this issue as he hopes to expand it into an article to appear in a later journal.

There followed a lively discussion on numerous subjects covering a very wide range of forestry theory and practice. An able panel, comprising Mr. Parkin, Dr. Jack, Mr. Kilpatrick, Mr. McGlynn and Mr. McEvoy, abetted by the president, Mr. Swan, dealt with the questions.

Members then participated in an enjoyable social evening organised by Mr. Dallas.

On Sunday morning the party visited the home and forest of General Moore at Mountfield. After a welcome morning tea, served by Mrs. Moore, the members were given facts on the lay out and purpose of the young forest.

General Moore said that the woods were intended to be a paying proposition, but that some experimental work in conjunction with the British Forestry Commission had been undertaken.

In a brief outline of the estate's history members were informed that it belonged originally to a family called McMahan. In 1872 the estate consisted of 12,000 acres but was broken up in 1880 and the family moved to the shooting lodge; the old house was pulled down. What remained of the original estate was recently bought by General Moore. The present residence was new, as the older lodge was destroyed by fire some years ago.

The property, he said, covered more than one hundred acres. The geological site was glacial moraine over schist ranging in altitude from 250' to 1,100'. Annual rainfall was 50 inches. Exposure increased with altitude.

Today sixty acres are under young plantations. Species were, Sitka spruce and larch primarily, with other conifer amenity trees. Part of the area now under plantation was the site of an exceptional larch stand which had been felled in 1946/7.

Mr. Mitchell, of the British Forestry Commission, had set out a larch genetics trial in which an experimental area of fifty-one plots in three blocks had been laid down. These had been established in 1956-7 and were subsidiary to a similar trial in Wales. They had now reached the end of their usefulness for genetic observations but the problem remained of treating them to gain a worthwhile economic return.

In the experiment, progeny from different seed and pollen parents had been grouped, and their characteristics noted. Favourable and unfavourable traits were compared, for example the absence or presence of twist depending on pedigree or non-pedigree parents. The famous Dunkeld larch had been selected for one set of parents.

Finally we were informed that other species had been selected for landscaping and amenity purposes. *Tsuga*, *Cedrus*, *A. nobilis* and *C. leylandii* were included.

A tour was made of the planted area and sample plots, after which the party returned to the house where Mr. Swan proposed a vote of thanks. Members then returned to Omagh for lunch where the session was officially brought to a close.

Review

Forest Research in New Zealand 1962

Forest Research Institute, New Zealand Forest Service.

THE professional staff of the Forest Research Institute totals fifty-three, including a Director of Research. That such a wide field can be covered by so few, even with the help of a large number of temporary "female computers", is a cause for admiration. One gets the impression, however, that too much has been attempted with limited resources, particularly in silviculture, and that they are now confronted with the unenviable choice of doing a little on a lot, or a lot on a little. This predicament is not, however, peculiar to research in New Zealand.

Forest research in New Zealand has begun to enjoy the patronage of private industry which proposes to contribute funds to the Research Institute to finance specific research projects. The report embraces research in silviculture, forest tree improvement, forest pathology, forest management, protection forestry and forest products. A brief description of developments in some of those branches may be of interest.

In silviculture the emphasis is on economics. The wide disparity in the thinning and pruning regimes being practised is a matter of concern. Although locality and site factors justify some variation, it is felt that the fluctuations in thinning schedules from year to year can hardly be justified. The case for more research in this field is considered to be of the utmost importance, particularly research on the effects of green pruning, on the mutual interactions of green pruning and thinning, on yield predictions for thinned stands and on the economics of alternative regimes carried through to the final processed product. The supply of high-grade timber from indigenous forests is rapidly approaching exhaustion and future supplies must come from exotic species, particularly *P. radiata*. An investigation of a stand which had received delayed thinning and pruning revealed that the pruning had been too late to give a high proportion of veneer quality timber. Although the better logs indicated the potential of *P. radiata* for supplying good veneers, it was clear from the study that if pruning is to effect the maximum grade enhancement, the branches must be removed while they are still green and small, without seriously reducing increment and without encouraging the development of large whorls above the pruned portion.

Yield tables for thinned stands have high priority in the research programme, although tables for unthinned stands have been in existence for some time. A study by Professor Spurr of Michigan University, during his period in New Zealand on a Fulbright scholarship, may help to simplify yield prediction. Working with Douglas fir, Spurr concluded that gross basal area and volume increments for thinned and unthinned stands were remarkably even over the range of thinning intensities applied.

In forest tree improvement there is a shift in emphasis from provenance trials to tree selection and breeding. In this connection it is thought that it may be desirable to pay more attention to factors related to specific end uses.

A significant correlation was found between seed size and altitude of seed source for indigenous origins of European larch, while a significant negative correlation was established between altitude and height of plants. Possibly this feature of seed size might be applied as an aid to provenance identification of *P. contorta*. *P. contorta* is used extensively for protection forestry and in New Zealand, also, there is "vocal and uninformed criticism" "(sometimes by people who should know better)" of the use of *P. contorta* on the grounds that it is a species with a high weed potential. While it is agreed that certain provenances of *P. contorta* do appear to have a weed potential on certain soils, it has been found to be the most promising species used so far in counter-erosion afforestation at high altitudes, just as it is second to none on our old red sandstone podsols and climatic peats.

The thesis that management and research are complementary is emphasized. "Assessment data are not much use without management, and management is on dubious foundations without reliable data on growth rates and increment." In New Zealand the complaint is of overconfidence by management in pilot research reports rather than a reluctance to accept the results of research. There have been instances, particularly in silviculture, where management, having accepted an interim result in pilot research, has gone well beyond it in practice. While it is thought that too much of this enthusiasm should not be encouraged, it is, no doubt, a measure of the confidence and trust with which management regards the Forest Research Institute.

P.J.

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Obituary

THE death of Seán O'Sullivan, on March 26th, 1964, sudden, untimely and tragic as it was in all its circumstances, brought a feeling of intense poignancy and loss to all those in the Forestry Service and others connected with forestry in Ireland, as well as to a wide circle of friends in various walks of life. Those who knew Seán O'Sullivan, and they were many both high and humble, will remember him as a man of modest personal charm, a man of great kindliness and consideration and high motive. Those who worked with him and under him in the Service appreciated in addition the solid basis of his knowledge of forestry, his unassuming and unassertive leadership, and his high integrity and capacity.



Seán O'Sullivan was a natural forester for, with most other careers as a possibility, he chose to do the Forestry degree course when he left school.

Born in 1912, he entered the forestry school at U.C.D. in 1930 and took his degree with honours in 1935 after which he went to Sweden for a period of study and joined the Forestry Division of the Department of Lands in January 1936. He served as Assistant and District Inspector at various centres including Dublin, Clonmel, Mallow, Portlaoise and Navan but promotion came rapidly and he was recalled to Dublin as a Divisional Inspector in 1944 and in 1948 was appointed Chief Forestry Inspector in succession to the late Mr. Barry. He served in this capacity until 1957 when he became Inspector General in charge of Acquisition of Land and Forest Research.

From his early days as an undergraduate Seán O'Sullivan had an indefatigable capacity for thoroughness and an untiring urge to get through superficialities to the core of all problems. This enabled him to acquire an exceptional knowledge and appreciation of forestry in all its aspects and to fill the highest technical posts with distinction.

His term as District Inspector at Navan 1938-44, a particularly arduous period due to war time conditions, is especially remembered and his work in the northern midland counties is bearing rich fruit now with some of the most valuable plantations in the country. He was particularly knowledgeable on the silviculture of Norway spruce and broadleaved trees, a knowledge which he acquired during his time at Navan and he also carried out the first Census of Woodlands, Eire in the counties attached to that district.

In his nine years as Chief Forestry Inspector he bore the ultimate technical responsibility during the great expansion period of forestry when planting rose from 3,850 acres per annum with an expenditure

of £320,621 to 17,407 acres and almost £2,000,000. This was the period not only of great expansion but of decisive technical changes and as Chief Technical Officer he guided the then new technique of the plough and artificial fertilization and the expansion of forestry into the peats of the West from Co. Kerry to Co. Donegal.

In recent years he was responsible for the development of Research from its establishment stage in 1957 and showed freshness of mind and breadth of outlook in directing its development along the most modern lines possible. Under his charge land acquisition also reached a peak during this period to cater for the enormous annual planting programme of 25,000 acres.

Mr. O'Sullivan represented the Forestry Division at meetings abroad, attending F.A.O. Conferences at Rome several times and the I.U.F.R.O. conference in Vienna in 1962, and as Chief Forest Officer took part in the important Ministerial visit to Scotland in 1950.

He was a foundation member of the Society of Irish Foresters and took part in its activities in the early years being a council member and treasurer and, although the onus of his official duties prevented him taking active part in committee of later years, he was always one of its most loyal and helpful supporters.

During his lifetime Seán O'Sullivan deliberately avoided the lime-light but as senior forest officer he has left behind him a permanent monument for all to enjoy by his country wide influence in the raising of our young forests which are plain to see for all who move through Ireland today.

He leaves us respected and honoured by all—one whose memory will remain green and affectionate in all our minds. He was particularly devoted to his wife and family—a great family man, and to them we offer our warmest feelings of sympathy in their tragic loss.

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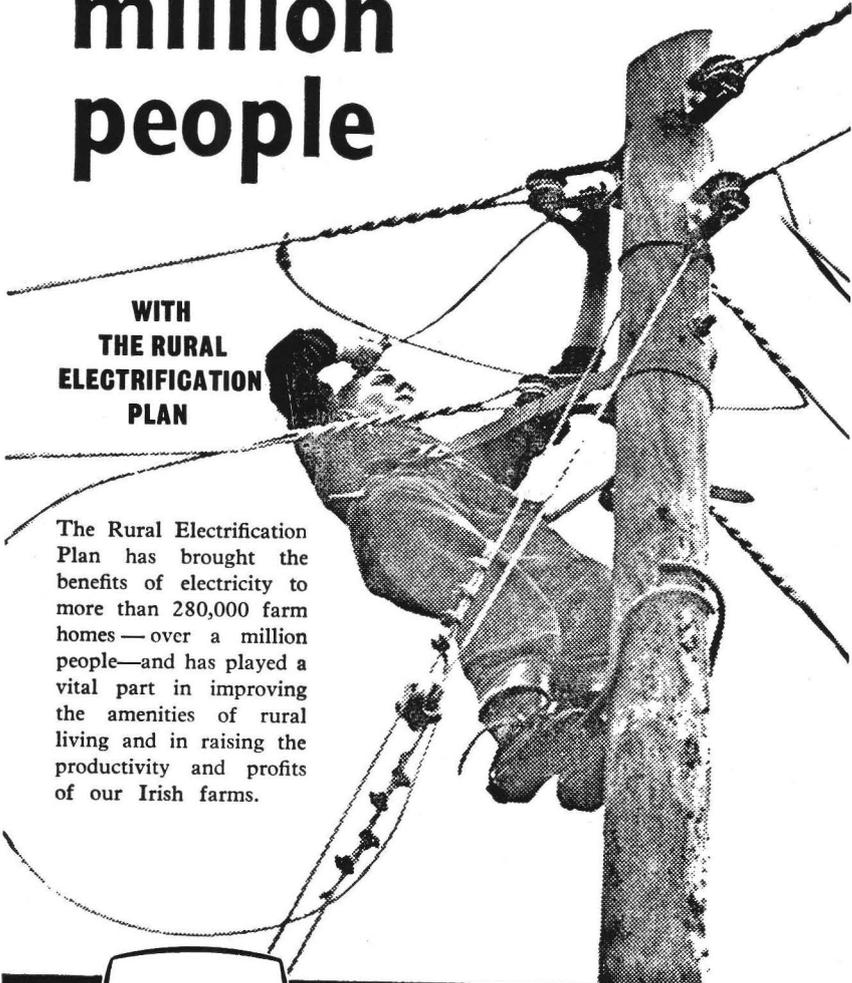
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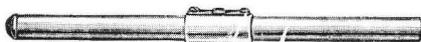
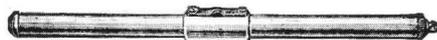
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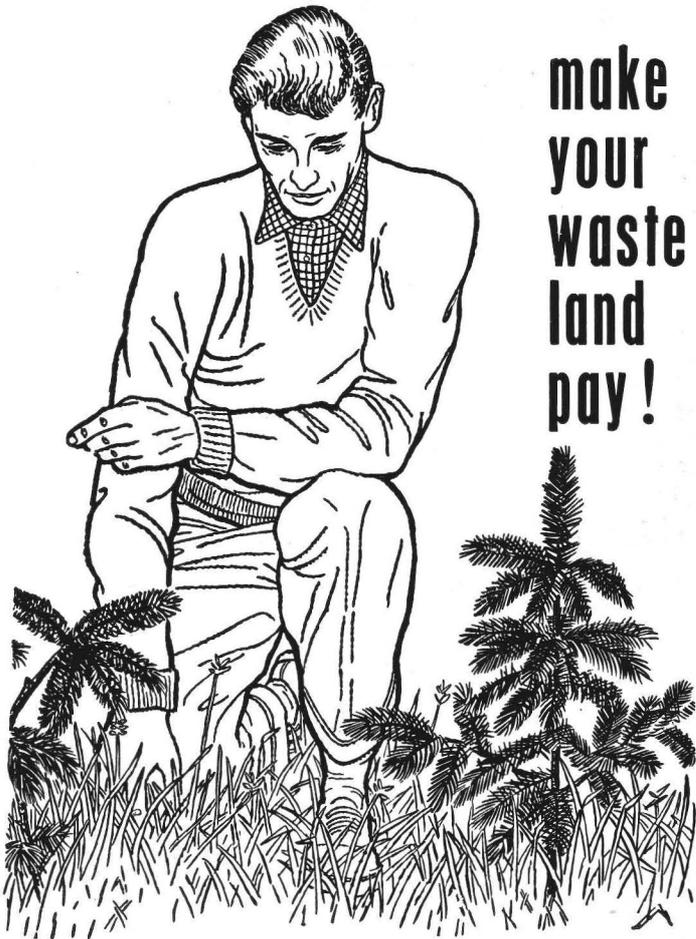
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