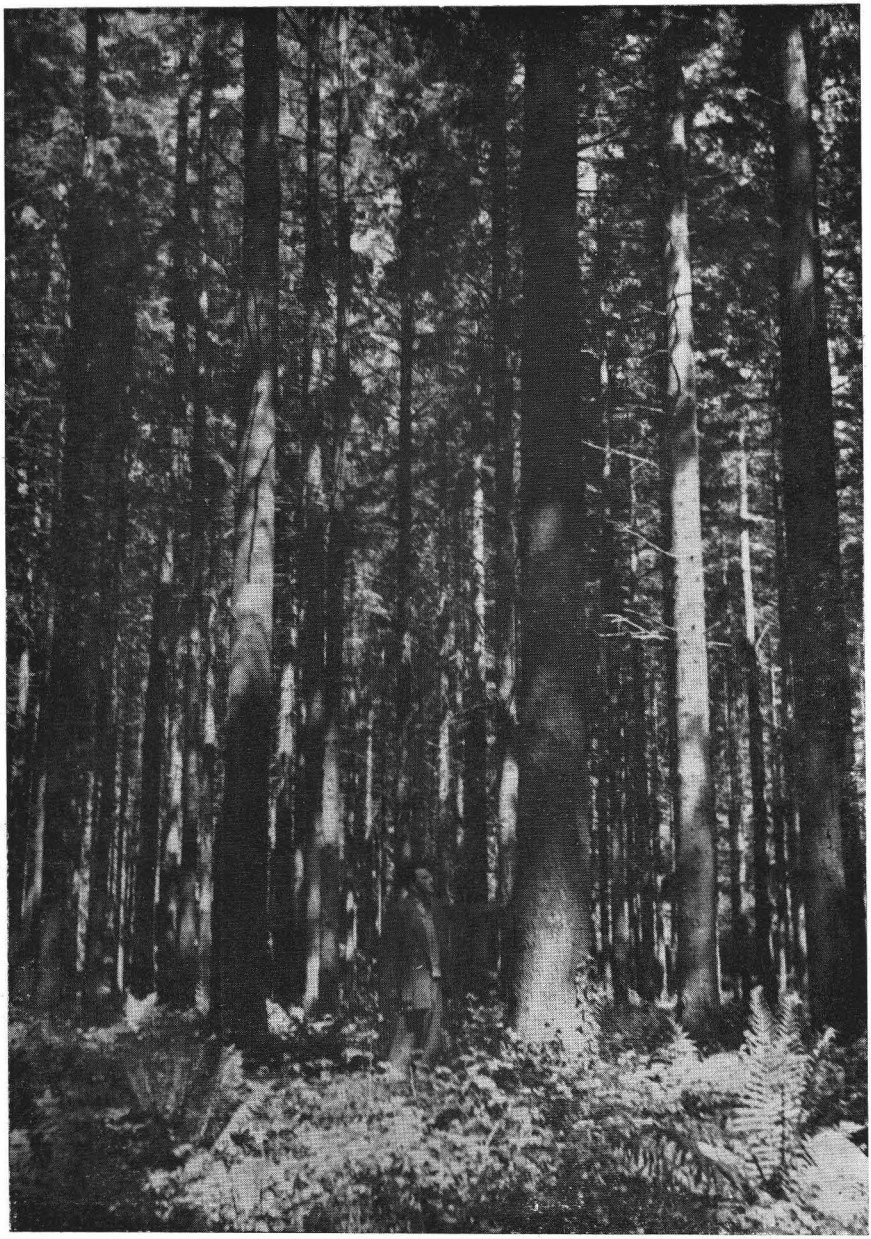
IRISH FORESTRY

Journal of the Society of Irish Foresters

Published Twice Yearly



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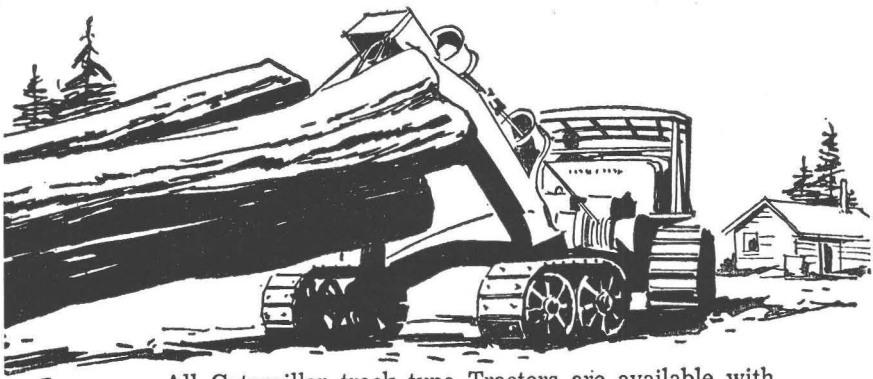

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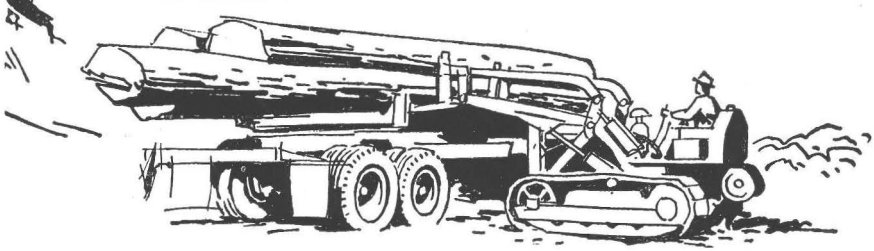

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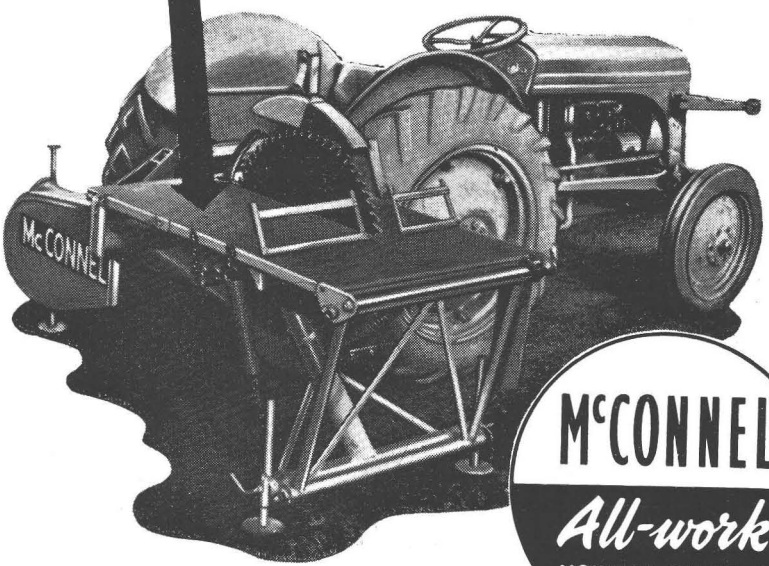

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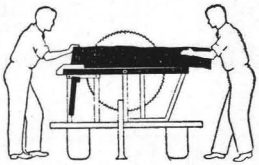

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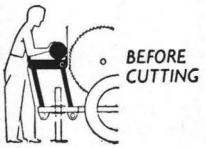

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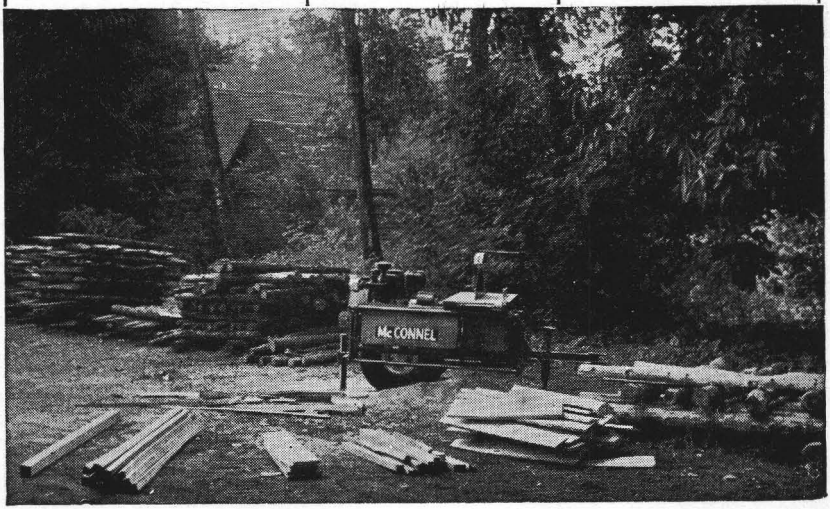

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IRISH FORESTRY

CONTENTS

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IRISH FORESTRY

VOLUME XIV SUMMER 1957 NUMBER 1

Editorial

A Returning Menace.

THE appearance of myxomatosis in Co. Carlow three years ago was an event of major importance to Irish Forestry. Helped by the rabbit flea the disease spread rapidly through the country until all but a few isolated areas were affected.

The introduction and spread of the disease was deplored by many: the naturalist bemoaned the fate of one of the most familiar and interesting of the country's fauna; many people living in rural areas lamented the wiping out of a source of cheap meat; the "lamper" found himself out of business and the sportsman had to think of other quarry.

The appearance of infected rabbits was none too pleasant and we all experienced a feeling of revulsion towards what was indeed a loathsome disease.

There was for the forester, however, another side to the picture: the wild rabbit, so long his arch-enemy, had, at last it seemed, met his Waterloo. Experience abroad of course indicated that a small proportion of the rabbit population could be expected to survive and that these, if not exterminated, would form the foundation stock of myxomatosis-immune animals. The forester nevertheless breathed a sigh of relief—the rabbit was no longer a force to be reckoned with at least for some years.

Up to that time forestry in Ireland had been grievously burdened by the expense of combating this pest. The cost of protecting plantations against its ravages was anything from 15% to 20% of total establishment costs. In addition there was the very significant loss due to the killing of natural seedlings and, sometimes, in spite of protective measures, the destruction of planted stock.

Irish foresters who studied the theory of silvicultural systems evolved in continental Europe, where rabbits were the exception rather than the rule, could only throw up their hands in hopelessness when they tried to put the theories into practice here: natural regeneration, which was the basis of most of these systems, just was not possible in this country owing to the presence of the rabbit.

Farmers too had suffered severely. Yields of corn crops had often been reduced drastically and production of milk, beef and mutton had

been depressed. Farmers were well aware of the fact that these losses far outweighed any value the rabbit might have had as food—rabbits reduced the grazing value of their fields not only by eating the herbage but by fouling the areas as well.

The disappearance of the rabbit, therefore, had, as one would expect, a marked influence on the countryside. Lush vegetation appeared on ground which hitherto carried only a carpet of moss. Farmers noted with satisfaction the increase in yields of milk and grain crops and the improvement in the condition of their flocks and herds. Foresters saw young natural seedlings gain a foothold and old seedlings which had been repeatedly nibbled back shoot away at last. More important, most of them saw their way to dispense with the use of expensive wire netting in fencing new planting areas.

While all this was taking place a small number of rabbits which had survived the disease had been multiplying in a fecund manner and we find that in some places today the menace is again raising its head.

The National Farmers' Association realize that a successful comeback by the rabbit could be achieved and they are organising counteraction through their branches.

It may be thought that foresters who have vivid memories of the depredations caused before the appearance of myxomatosis should not need to be reminded of the importance of stamping out the pest as soon as it appears in their plantations. Foresters are, however, busy men and in the execution of their programmes, which tax their time and energy to the limit, there is a danger that the re-appearance of the rabbit may not receive the attention it merits. This applies particularly in the case of plantations which have passed the vulnerable stage. It must not be forgotten, however, that farmers' efforts at extermination may be thwarted by the fact of those plantations serving as breeding grounds and havens for hunted animals.

Foresters should, therefore, tackle the job of extermination in a determined manner. Every available means short of deliberately spreading myxomatosis—this may not now be possible anyway—should be employed. Trapping, snaring, shooting, gassing, any or all of these methods should, if necessary, be employed. The war on the rabbit should not be confined to any particular season of the year; it should, if necessary, be waged all the year round.

No campaign can be regarded as successful until the last rabbit has been exterminated. To achieve this a well co-ordinated effort by all land users, for which the conditions are now ripe, is absolutely essential.

It is indeed a matter for regret that we have to employ such methods as trapping and gassing but there are hopes that a more humane type of trap may be developed in the near future. The problem, clearly, does not brook delay. Prompt action is necessary.

The Constitution of the Society.

In the early days of the Society when there was a preponderance of technical members in relation to associate members the latter had no vote nor were they eligible for election as office-bearers or members of the Council.

As the years went by, however, the proportion of associate members increased to the extent that it was felt that some alteration of the Constitution was necessary.

Accordingly at the annual general meeting of 1948 changes were introduced which gave associate members the right of nominating members for election to the Council and of voting as well as giving them a representation of two on a Council of twelve.

As many members have joined since that time the Council decided last year that it was desirable that the Constitution in its present form should be circulated to all members.

Accordingly copies have been printed and issued to members. Non-members interested in securing copies should make application to the honorary secretary.

Cover Photograph

The Cover photograph shows a mixed crop of douglas and norway spruce growing in intimate mixture on a sheltered alluvial plot at Compartment 8, Avondale, Co. Wicklow.

The trees are recorded as having been planted at $3\frac{1}{2}$ ft. spacing in 1905.

Recent sample plot measurement gave the following results :

Species	Douglas	Norway Spruce
Number of Stems per Acre	80	74
Mean Tree Heights	107 ft.	94 ft.
Volume per Acre (Hoppus ft. U.B.) ...	4,377	2,327

Policy Statement on Irish Forestry by The Minister for Lands *

Research.

THE increase in Inspectorate staff includes a staff nucleus for the commencement of forestry research work. Up to the present the Forestry Service has had to rely, for research data, almost entirely upon the work carried out in other countries. In many aspects of Forestry there is a sufficient identity of conditions between this country and Great Britain to justify reliance on the research findings of the British Forestry Commission and the Commonwealth Forestry Bureau. There is, however, an urgent need for greater progress with practical field research by way, for example, of the careful control and documentation of experimental plots designed to ascertain the reactions of different species to specific treatments and management techniques over a representative range of soil and climatic conditions. It is intended that the initial research programme will be mainly directed towards such practical controlled experimentation, including tests specifically directed towards the determination of practical limits and optimum techniques for the afforestation of marginal land-types. The new staff also includes provision for a permanent system of assessment of growing stock. Such assessment based on a periodic scientific survey of the entire range of plantations, is essential to proper prognosis of future timber availabilities and will, at the same time, afford much valuable information in regard to the timber yields to be expected from different species under Irish conditions and, in regard to the thinning techniques, most likely to facilitate maximum production and high quality.

Acquisition of Land.

The total area acquired in 1956/57 was 18,725 acres of which approximately 16,500 acres was productive. The total productive area acquired is not the highest figure so far attained in a single year—larger productive areas were acquired in 1952/53 and in 1953/54. An adequate intake of plantable land continues to be the most essential pre-requisite to enlargement of the annual planting programme and an intake of 16,500 acres of productive land in a year in which 17,500 acres were planted out of a comparatively small plantable reserve does not demonstrate the feasibility of a steady and rapid increase in the planting rate. Since the area planted in each year includes a proportion of land previously classified as unproductive but now considered capable of afforestation in consequence of new techniques and increasing

* Extracts from Mr. Erskine Childer's speech in the Dáil on the occasion of his introducing the Forestry Estimate on April 24, 1957.

experience and includes also some cleared woodland, there has not been any significant decrease in the plantable reserve from the level of 49,000 acres at which it stood a year ago despite the excess of the year's planting over the intake of productive land. A reserve of that level is not, however, comfortable enough in relation to the contemplated future rate of planting and a continuing increase in the planting rate could be viewed with greater equanimity if the plantable reserve were showing a steady and proportionate enlargement. The plantable reserve has, in fact, increased by only 4,000 acres since 1954 when the annual planting rate was 12,500 acres.

There appears, however, to be some cause for optimism in current figures relating to lands in course of acquisition or under consideration. As at the 1st April, 1957, the legal formalities had been cleared and possession was pending in the case of 42 properties totalling 2,852 acres. Bargains had been struck and title was under investigation in the case of 504 properties totalling 39,482 acres and negotiations on price were in hands in relation to 2,055 properties totalling 165,255 acres. The aggregate of these figures—a total of 207,589 acres—compares very favourably with the corresponding figure twelve months ago, 145,913 acres. It is anticipated that the total area acquired in the current year will approximate 25,000 acres.

Whether it will be possible to maintain the acquisition rate at that level in future years is, of course, more open to question. Apart from the properties of which I have already cited particulars, 1,230 more recent offers of lands totalling 110,000 acres were under preliminary investigation at the 1st April, 1957. Subject to some reservations to which I shall refer later in regard to continuance on the present scale of the acquisition and planting of some of the more dubious site-types which have been the subject of extensive planting experiments, it appears likely that the intake of plantable land can be maintained by continuance of the really energetic efforts which the Department has been devoting to this aspect of its work.

Planting Programmes.

The Dáil was informed last year that 17,500 acres would be planted in that year, that it was intended to provide for a planting programme of 20,000 acres in 1957/58 and for two further increases of 2,500 acres each in the next two years.

The planning of a 20,000 acre planting programme for a year at the commencement of which the available plantable land was under 50,000 acres is not easy. A considerable portion of the reserve is comprised in large blocks at a comparatively small number of centres at which the existing plantations are all of recent date. An example of this is Meenirroy Forest with a productive area of 2,418 acres. Planting commenced in 1951/52. A total of 1,430 acres has already been planted,

the average annual planting programme being 238 acres. If the 988 acres still remaining to be planted is handled at too fast a rate, a really difficult problem of management will be presented in another fifteen years when the plantations reach the thinning stage. To avoid an excessive planting rate at such Forests as Meenirroy, we will have to rely on some of the areas actually acquired in the current year to make up about 1,000 acres of the total planting programme for this year. This year's planting programme will bring the total of State Plantations to 248,000 acres of which 142,500 acres represent the post-war plantings.

The high percentage of our total plantations laid down since the war is in large part attributable to the new mechanical aids to afforestation of peat areas which were developed post-war. My predecessors have informed the Dáil on numerous occasions that some of the additional planting rendered possible by these new techniques was on extremely unpromising areas and that some of this experimental work was far in advance of any similar experimentation in other countries. I have not yet had an opportunity of examining fully this whole question of experimental planting of doubtful sites. I understand that, so far, the young plantations have not suffered any serious checks and that there is an increasing probability that growth will continue unabated. There are still other problems associated with these areas, however, including the particular vulnerability to wind and snow damage of rapid-growing species in wet bog areas, and the whole question of the value and economics of this type of afforestation requires careful and constant examination.

Influence of Forestry on The National Economy.

The heavy annual capital investment liability of forestry and the long period which elapses before produce is obtained makes it imperative that the utmost possible revenue be derived from thinning produce. In any forest economy, thinning produce is assuming a rapidly-growing importance in present day financial conditions—an importance enhanced by the usability of thinning produce in the production of paper, wall-board and other timber derivatives which are fast replacing sawlog timber as the keynote to successful forest exploitation. Ours is a young forest economy and it will be some considerable time yet before our availability of material for pulp and similar processes approaches its maximum level but we are entering the phase in which thinning produce will rapidly increase and we are already at the stage at which we can plan ahead. We have, in our very newness to this field of industrial production, a magnificent opportunity of ensuring that the fullest value is obtained from modern experience elsewhere to develop an industry which will combine all the efficiency which up to date methods will give with the advantages to be derived from a proper blue-printing and co-ordination of its different aspects to give us the

maximum possible and most remunerative possible utilisation of our forest produce. This matter has for some time been engaging the active attention of my Department, the Department of Industry and Commerce and the Industrial Development Authority. We are most anxious that the development of this industry should be on lines which will contribute in significant degree not alone to the forest economy but also to the wider national economy by assisting the solution of balance of payments problems. The extent to which full utilisation of thinning produce can aid in rectifying balance of payments difficulties will be apparent when I say that the thinning produce of the 20,000 acres annual planting level operative this year, fully exploited for paper production, could alter our present position of importing £4 million worth of paper and cardboard more than we export to one of having an export excess of an order exceeding £5 million while our present imports of £6½ million worth of mature timber should be replaced by exports in value somewhere between £10 million and £20 million—assuming present world price levels and an increase in home consumption.

That is the attractive future gain to the country from a steady planting programme of the order now being undertaken. An annual turnover of 20,000 acres of forest could also provide permanent employment for 28,000 men in the forest apart from the many others who would find employment in the processing and transport of forest produce. But to-day we are still many years away from that situation. The planting of 20,000 acres of forest this year will, with the expansion of other forest work, bring total employment in the forests for the year up to an average level of over 6,000 men excluding persons engaged in transport or processing of timber. That itself is attractive as a contribution towards the immediate employment needs of the country. The figure I have just quoted includes a direct labour force for the current year averaging 5,550, the balance being estimated employment of labour in the forests by purchasers of timber. The average number employed on direct labour work in 1956/57 was 5,048 and the figure at the beginning of April was 4,937. This projected rise in forest employment for the year is reflective of the increase in the total of the gross estimate, 80% of which is for salaries, wages and payments to carters.

This singularly high proportion of expenditure which is directly devoted to the giving of employment is the only immediate gain from the heavy capital outlay which our afforestation progress entails. It is unfortunate—but inescapable— that the employment given in new planting gives no immediate return in terms of increased national production. In that respect, it is questionable whether this small country, with limited capital resources, with problems of a considerable excess of imports over exports and a plethora of other economic difficulties can really justify a steadily increasing annual capital investment

in afforestation which is already close to the level of £2 million a year. The capital being devoted to afforestation could, if wisely spent in other spheres of national economic development, produce almost immediate results in productivity gains. Devoted to afforestation its immediate economic effect is purely inflationary. Wealthier countries, countries with more highly developel economies and greater facility for long-term investment, have considered it prudent to steer a course of moderation in this matter of afforestation. Our inherited paucity of woodland has led us, however, to undertake afforestation on a scale which is quite phenomenal in relation to our resources and our needs.

The expenditure which we are incurring to-day in this afforestation drive is undoubtedly a tremendous contribution towards the economic and national wellbeing of future generations. Viewed thus as part of this generation's sacrifice for the ultimate good of the country, capital investment on the present scale in afforestation is eminently commendable but if there is to be a real ultimate gain we must be ever mindful of the interim harmful effects which this type of long-term development without immediate productive gain can have on the economy of the country. That mindfulness must be translated into a sensible determination that economic rather than social objectives must guide our forestry endeavours and that our forestry undertakings must be so managed as to give the maximum contribution towards economic wealth from the minimum practicable consumption of man-power and money. If the main need of this country to-day is an increase in production—or, in other words, more output from manpower and capital employment—in all sectors of our economy, we must especially make high output and cost limitation the basis of our approach to an aspect of our economy from which there is no immediate productive return.

I have referred already to the high labour content of forestry work. In forestry, output and economy desiderata call particularly for strict limitation of man-power consumption to operational activities directly contributing to ultimate timber yields, elimination of inefficient staff, sound costing control and full use of mechanisation techniques. I am glad to be able to say that I have found a ready responsiveness to these needs amongst those officials of the Forestry Division with whom I have already come in contact. I understand that certain steps have already been taken over the past few years to secure improved outputs and cost economy and that an even more intensive drive to step up labour outputs was initiated last year. The full benefit of new costing methods then introduced will not accrue immediately, but already substantial gains have been secured over a number of operational cost heads. I have assured the officials of the Department that their efforts in this sphere will have my full support and I want to take this opportunity of telling the House that I intend, in particular, to seek an adequate standard of work performance as a qualification for retention of any worker in forest employment. Incentive bonus schemes may be

a help towards securing good work outputs and their possibilities will be fully explored. In our present economic circumstances, any growth in our trade will place a tremendous demand on capital. This means that the retention of an inefficient worker will be preventing another efficient worker from securing employment elsewhere. I am sure that the whole staff, including the vast majority of the workers, will appreciate the truth of this statement.

Private Forestry.

It is by this increasing cost-consciousness that I hope we can continue indefinitely the really excellent progress which is being made in the State afforestation programme. It seems to me, however, that it is a great pity that more is not being achieved by way of planting on privately-owned lands. Subhead D of the Estimate now before the House provides for an increase of almost 50% in expenditure on Grants for such planting. The increased sum to be devoted to this work is, however, a mere £5,000—a tiny fraction of our total forestry expenditure. It is small because there is still no real progress in this matter of private planting. In the year which has just ended, only 625 acres were planted. That is, I think, quite tragic. Privately-owned woodland rarely achieves the same level of overall productivity as State Forests and it is quite clear that in our own country the pattern of land tenure, the predominant importance of agriculture and the density of our rural population preclude reliance on privately-owned woodland as a main source of timber supplies. It is equally true, however, that there are patches of land of varying size all over the country which would give greater productivity if they were put under timber but which cannot readily be absorbed into the State Afforestation project. Some of this land is not, at the moment, being put to any use. Some of it is devoted to grazing but could be released from that use without loss of mutton or wool if increased recourse were had to fertilisers to step up the productivity of other grazing lands on the same holdings. An overall national plan aimed at maximum production from all the resources at our disposal demands that these potential woodlands be planted. I have been giving this matter quite a lot of thought since I became Minister for Lands a month ago. I am determined that there must be a really active campaign to secure more private planting. At the moment, I am still awaiting the results of some of my enquiries into the factors which may be deterring people from undertaking such planting, and I am reluctant to say anything as to the form which the campaign should take until I have completed my study of the matter, but the House may rest assured that one of my main objectives, as the Minister in charge of forestry, will be to secure a big increase in private planting.

Only if we can secure that measure of co-operation from private landowners will I, personally, feel convinced that our people want forestry and are prepared to share the task of fulfilling their desire.

To-day's position where we have an insistent clamour for more and more afforestation but no significant attempt at planting by the many hundreds of owners of suitable land is, to my mind, a symptom of our economic malaise. If we are to become a prosperous people, self-reliant in a well-balanced national economy, we must find the cure for that malaise in every form in which it is endemic amongst us.

European Experiences with Douglas and other Conifers from Western North America

Address to the Society's 14th Annual General Meeting

By Herr Oberregierungsrat Karl Oedekoven

IT is generally known that in the 16th and 17th century all Europe suffered from a tremendous timber shortage which was mainly caused by wars, reckless exploitation and other circumstances. This time of timber shortage has found its classical description by the famous economist Werner Sombart in his impressive article. "The threatening end of capitalism". To him the timber shortage is in fact a symptom of the gradually appearing end of European culture which was called the wooden culture. It is quite interesting that Sombart associates this timber shortage with another symptom of decline namely the reckless exploitation of foreign nations and cultures which also leads to the exhaustion of wealth.

The timber shortage greatly alarmed the foresters of that time and incited them to improve tree cultivations, to develop forest management and to originate the idea of sustained yield from their national timber resources.

One of the means to produce more timber was the introduction of fast growing species. Since it was not possible to remove this penury directly they at least wanted to shorten the time that the forests needed to offer sufficient timber again. Instead of the hardwoods with slow growth like oak and beech they grew more poplar, white alder and, mainly, birch. Birch especially was grown to such an extent that this tendency was called "Betulomania". Species which promised an increase in timber production were taken even from far away. In 1638 the *Robinia pseudoacacia* was brought to Paris from North-America by Robin. Around the middle of the 18th century this tree gained importance also in Germany. At the same time the first cultivations of larch

were established which originally had its range only in the Alps and the Sudeten mountains. In this first period also in which exotic trees were favoured white-pine came in.

Pseudotsuga taxifolia.

A second and greater activity originated at the end of the 1870's from the initiative of our Chancellor Bismarck who interested John Booth of Klein-Flottbeck near Hamburg to experiment with exotic trees, especially with douglas (*Pseudotsuga taxifolia*).

There is no doubt that amongst all exotic forest trees douglas has held the leading position since these early days both in the extent of its cultivation and in its general importance on the timber market.

I, personally, had the good fortune to study this species in Oregon about 20 years ago and later in my practice as District Officer in the Harz Mountains. I had quite a few douglas stands belonging to different age classes and we have added to that area new plantations of 50,000-80,000 young douglas trees every year.

So, I hope, you will have no objection if I devote the main part of my report to douglas.

If we try to transfer the natural range of this species from Western North-America upon Europe and Africa it would cover an area from Ireland or East Prussia down to the Northern region of the Sahara and from the Atlantic to the Carpathian Mountains. From sea level we would find it up to an elevation of 9,000 ft.

Belonging to a genus of which there are only two species native to North America and only one to Oregon douglas ranks as the most important timber species of North America if not of the world. The timber has excellent qualities and a wide range of uses. The boles of forest grown trees are massive, clear and taper very gradually. In the average stand on favourable sites, mature trees are from 5 to 8 feet in diameter and 225 to 275 feet in height. Exceptional trees have been found 12 to 15 feet in diameter and more than 330 feet in height.

The gross volume of the average stand is from 50,000 to 60,000 board feet* per acre, single acres with half a million feet or more have been cruised.

In the U.S.A. where more than 3 million acres of forest land are to be reforested with this species, the seed is taken from neighbouring stands if ever possible.

But there are certain cases where this cannot be done. Therefore, a lot of rules have been developed for the selection of seed-production stands the seed of which must not be used further north or south than 100 miles. Already for each 10 miles distance to the north or to the

* 12 board feet equal 1 cubic foot.

south adjustment has to be made in choosing the proper elevation for the plantation.

If these difficulties to provide the right seed exist in the home-country of douglas it is quite evident that we are facing trouble in Europe where climatic conditions are so different. Especially the distribution of the precipitation per year varies greatly in our countries compared to Western America where we have very dry summers and where most of the rainfall occurs in winter-time. It has been a very lucky coincidence that the first large douglas plantations which were established in Germany between 1880 to 1890 originated from seed of Western Washington, whereas in the following decades Schwappach called for greater imports of seed from Colorado and other unfavourable locations. John Booth, whom I have already mentioned probably got his seed from mother-trees in Scotland which were also grown from seed of Western Washington.

Quite a few of these early plantations are still left as 60 to 70 year-old stands, thrifty and healthy, and every time that there is a good seed-year we try to use the last cone, provided that they are not in the neighbourhood of poor quality douglas stands with which they might have crossed.

As you all know we distinguish between 3 types of *Pseudotsuga taxifolia:* We know

the green or *viridis*-type
the grey or *caesia*-type and
the blue or *glauca*-type.

As all our experiments prove the *viridis*-type promises the best results for our European conditions and it might be best, perhaps, if I try to give you a summary of our experiences by going through the whole rotation of a douglas stand from the seed to the felling.

Nursery Treatment.

Douglas is one of the species that require stratification or pre-sowing treatment to break dormancy. It consists of placing the seed in a moist medium, such as peat, moss, sand, or sawdust and keeping it at temperatures from 32° to 41° F. We usually put the seed in a box filled with sand and leave it in the open all through winter.

When we finally take the seed out to the nursery in spring it is most important that the sowing is not done on heavy soil which is not at all suitable for any nursery.

Comparisons where the same seedlings were transplanted, some on heavy soil and some on lighter soil, proved that the transplants on the loose soil grew 3 times as tall as those on the heavy soil. This observation also applies to new nurseries established on clear-cut forest land where the stumps had been blasted and where thus the soil had been

compacted. And not only does heavy soil affect the growth of the trees, the needles turn yellowish and total losses will be high. To sum up I might say that the quality of the nursery stock very often stands in a reversed proportion to the quality of the soil.

Another important requirement for douglas nurseries is a comparatively dry soil. The tree is used to a dry summer in its native country, while we usually have a reasonable amount of rainfall during this season which tends to prolong the vegetation-period. This is undesirable as a rather early end of the yearly growth is important for the formation of the winter-buds.

Ideal pH of soils for douglas nurseries should range from 5.0 to 6.0. The most desirable amount of fertilizer can best be determined by local experimentation. Too heavy doses, though, might be dangerous. The young seedlings grow too fast if they are overfed and if such tall nursery stock is planted out great losses are likely as they transpire more water than their roots can assimilate in the first growing phase.

It is indispensable to protect the seedlings from wind, sun and frost, which is especially important in open nurseries where there is no side-protection from neighbouring stands.

Straw-mats, branches or twigs of broom that we put over, around and between the beds have shown good results.

Depending upon the growth the transplanting is done when the seedlings are 1 to 2 years old. If the seedlings have suffered from frost in the first year—which unfortunately happens rather often—we should leave them in the seed-bed for another year. We have found that losses are markedly less than in case of transplanting them. Under good conditions the 3 year old transplants reach a height of $1\frac{1}{2}$ foot or more, therefore they should be spaced not less than 4 inches apart. As to the distances between the rows we allow for at least 10-12 inches to permit multiple-row cultivation. These wide rows are very essential. Hardly any species suffers as much from root damage as douglas.

When the transplants are finally lifted with digging forks or mechanical lifters air temperatures should not be below freezing as the fine rootlets are liable to frost damage. As to the cutting of roots we should avoid it if possible, as our comparisons prove that young trees with cut roots grow worse than untreated material.

Planting Sites.

If we examine the forest soil and site quality of existing stands and if we want to determine where it finds good growing conditions we come to the conclusion that apart from extremely light or heavy and wet soil most forest soils or sites are suitable. The actual yield obtainable from any stand is affected, of course, by many factors such as wind, rainfall, temperature, altitude, slope and aspect. But it would be difficult, if not impossible, to say what part each physical factor plays

in making an area productive. Yet our study has given some indications of the combinations of factors that contribute toward productivity.

In its natural range in Western North-America douglas is not used to strong winds. Perhaps you know that in our German language the Pacific is called the "Quiet Ocean" and this name is especially justified as far as Oregon and Washington are concerned. As a result of this hardly any other tree suffers as much from wind or storm.

Most of our exposed stands or single trees show wind damage in their wry, bald or broken tops. And without any doubt such permanent injuries to crowns and foliage reduce the increment of the tree very markedly. This undesirable effect partly explains the lower yield which many European stands produce in comparison to American volume growth. It is a vicious circle that these damages grow larger as the tree grows older and higher. The American yield tables indicate that a 100 year old douglas stand will reach a height of 180 ft. on Site class 1. If you grow douglas in mixed stands you will hardly find any other species that may compete with this growth. So, as a result of this experience we try to avoid the planting of douglas on locations which are exposed to the wind, and from the same experience we prefer cultivations on large areas where in the higher age the trees are less damaged by wind. You might object against douglas stands on extensive areas that there is the risk of the needle-cast (*Phaeocryptopus Gaümannii*—or formerly *Adelopus*. This is true, of course, though this needle-cast mainly occurs in mountainous or coastal regions with wet summers. But this disease seldom kills a stand very suddenly and if for some reason the whole stand has to be cleared off at once the timber may be utilized at any age and will yield good revenue. And, finally, the falling out of one larger area is less detrimental to a forest than losing numerous groups.

Aspect was found to be an important factor in regulating the productivity of douglas. The most rapid growth was observed on slopes facing north, northeast and east, probably because the soil on these exposures is less subject to the drying rays of the summer sun and consequently remains more moist than on other aspects. The south and west aspects were found to be more variable in their effect on site than the sorth to east aspect. The poorest sites were found on south to west aspects, or on level ground.

Slope affects site quality by reason of the fact that, even when other factors remain the same, an increase in the gradient makes possible a more advantageous exposure of the crowns with resultant increase in density of stocking.

Silvicultural Considerations.

An ever important problem has been the question : Should we plant douglas in pure or mixed stands? In its home country the tree,

especially the *viridis*-type appears mostly in even-aged stands, sometimes pure and eventually mixed with other species. In the upper age classes it is seldom mixed with hardwoods. None of our native species is able to mix with it through its whole rotation in equal vitality. The spruce singly mixed into a douglas stand is very often overgrown at an early age. The same holds true for european larch, it only occurs at a later age, perhaps when the trees are 30-35 years old. A mixture of douglas and beech will finally result in a pure douglas stand unless we have to do with excellent beech sites. In a douglas plantation in the Eifel mountains where hardwoods were brought in singly or in groups all hardwoods are completely overgrown or suppressed after 11 years. Only few American species like *Abies grandis* and *Abies nobilis* are able to compete with it in its vigorous growth. But *Abies grandis* has little commercial value and is only eventually cultivated in Europe for its glossy green foliage, and *Abies nobilis* is only suitable for mixing with douglas in our northern mountains at an elevation of around 2,000 ft. If in the first decades of its rotation douglas is overgrown by other species—which likely happens with japanese larch or with beech on lime or loess soil the douglas might be easily infected by needle-cast.

And yet, in spite of all these difficulties it is mostly grown in mixture with other species. It is quite obvious that already the high price of seed or transplants of the species and the difficulty in meeting the demand suggest such a procedure. In Germany norway spruce ranks first amongst all species which are mixed with it, the proportion of douglas to spruce may be 1 :1, 1 :2 or 1 :3. The young trees are planted alternately in the rows as well as from row to row. In earlier times the different species were planted each one separately in a row but this practice is no longer used as in the final stage the remaining douglas stand had holes in the canopy and thin spots due to wide spacing, both conditions contributing alike to subnormal stand volume. Another common practice, if only few plants are at hand, is that they are mixed in in little groups, but the proper spots for these groups have to be carefully selected as one always has to consider that these groups might survive when the rest is mature and will be felled.

Two important species which very often appear in mixture with douglas in its home country are *Thuja gigantea* and *Tsuga heterophylla.* According to our experiences they might play such an important part in European silviculture for the future that I shall cover them in separate paragraphs later on.

And as to the question of mixed or pure stands I want to underline at this stage that quite a few of the objections which we have against pure spruce stands do not hold true for douglas. In its root energy douglas ranks between spruce and silver fir. It has a very dense root system which fills all spaces in the soil whilst for spruce large parts of the soil around the main roots are absolutely free of finer rootlets.

Therefore a pure douglas stand is much less exposed to windthrow than a spruce stand might be on the same soil. Though the proportion of carbon : nitrogen in douglas litter is less favourable than in spruce or pine needles it easily decomposes and there seems to be no disadvantageous effect on the soil, especially in the United States where pure douglas stands have covered certain sites for centuries no deterioration of the soil has been noticed.

I have already mentioned how susceptible the seedlings are to frost damage. The same applies when nursery stock finally is planted out in the cultivation. Two year old seedlings are especially endangered as they have not yet overcome the shock of transplanting like 3 year old transplants. The damage usually runs high if the transplants are extraordinarily tall or if the cultivation is carried out on extensive clear-cut areas in higher elevations. If such plantations were actually damaged by late frost in a mountainous location we have often observed the following symptoms : after the top-part of the little plant had died new shoots developed around the lower stem and kept on growing till late in the year and if weather conditions were unfavourable a late frost finally killed the whole plant.

So, it is quite important that douglas plantations are established under some sort of a shelter if at all possible. Several methods have proved to be quite efficient in this regard : Where available we take advantage of existing coppice, birch thickets or even broom brush which are thinned in a very drastic way so that only a light shelter will be left. If we have to afforest blank areas without any cover we like to plant white alder in the first phase in a wide, loose spacing to serve as such a shelter and we have even used the fast growing poplar for this purpose in cases where site and soil were suitable for the poplars. It is important, however, that none of this shelter be left too long as all these species then tend to suppress the douglas and to diminish the increment. There is also greater danger of needle-cast infection as high relative humidity under the shelter favours the conditions for the development of this disease. In a douglas plantation near Bonn which was partly established under a light shelter of birch which is about 12 feet high and has a spacing of 9 ft. square there is evidence that only some of the plants under the shelter turned brown while all the rest of the plantation on the bare ground was heavily damaged by an early frost which occurred on September 21, 1951.

Finally the light shelter seems to restrain the development of weeds thus saving money and favouring the growth of the douglas. I might add to this point that on very extensive areas where we establish douglas plantations under the shelter of existing species it has become a good practice not only to create this shelter but to leave some strips of the thicket, coppice or brush untouched. These wind-shelter belts which we leave in the shape of frames surrounding 1 to 3 acres of plantation have proved very helpful.

Plant Spacing.

The spacing in douglas plantations, whether in pure or mixed stands, varies from 3-7 ft. square. As pruning has to be done in almost any case no matter which spacing had been chosen we may neglect the detailed consideration of pruning in this regard.

Pure plantations in a narrow spacing yields early thinnings and remarkable revenue from selling the green branches provided, of course, that there is the proper market. In the U.S.A. where chances to sell the small poles and the branches are limited douglas plantations are usually established at a wide spacing which means that only 500 to 700 plants are planted per acre. As the price of plants is comparatively high the question of the proper spacing deserves careful consideration. For instance if we have to choose between a spacing of 3 ft. square or 5 ft. square we must realize that the wider spacing will be about £35 cheaper per acre than the narrow one. The final decision depends greatly upon the local conditions, especially on the soil. An experience for which we have no complete explanation yet has taught us that densely planted douglas on soil with a high proportion of silt particles suffers more from windfall and snow-break than plantations on coarse soil. So, as a rough rule, we might say that the best spacing for douglas is 5 ft. square on coarse gravelly soils, 6 ft. square on sand and sandy loam and 7 ft. square on silt and clay loam.

Type of Plant and Time of Planting.

In the U.S.A. a great number of the present douglas plantations are established with 2 year-old seedlings. As each transplanting causes certain losses and as especially douglas is a very delicate species in this regard we should benefit more from the American experience, at least on such soils where there is no danger of intensive weed growth. As a matter of fact, we in Germany had to use this method extensively in the years after the war when older nursery-stock was not available, and as far as we can say now we have had good results. It is essential, however, that these seedlings are sturdy and healthy, and I might even recommend that their roots are treated with a root-cutter when still in the seed bed to stimulate the development of fibrous roots which will pay by a higher survival than those with only large tap and long lateral roots. The worst material should always be rejected and the existing heavy demand should never lead to using also plants of dubious quality. We must never forget that our experimental lots of douglas which we established in 1910 showed the marked differences in growth which were evident in the nursery and in the young plants still 25 years later.

For douglas the time between lifting and planting must be as short as possible. I want to underline that this rule is about the most important one for a successful cultivation of this tree. A longer transport might already be fatal. In 1930 a comprehensive campaign for planting

the species in different regions of Germany proved that losses run parallel to the distance of transport.

In the most critical phase from early March to the time when the buds start to swell the plants should not be touched at all. If they have to be transported the lifting should only be done shortly before delivery. Some German experts claim that douglas even suffers if kept in heeling-in beds after delivery and therefore recommend immediate planting when the young trees arrive. Ernest Pein, the president of our commercial nurserymen, has developed a special packing procedure known as "Shipping in soil cover" which ensures proper treatment of young trees from the moment they are lifted until they are planted.

The best time for planting and transplanting seems to be Spring. No other species requires such a careful control of this short period as this tree. It is about the time—as I already mentioned—when the winter buds start to swell, a process which usually occurs around the middle of April, sometimes as late as in May. As a rule we might say: douglas planting is always the last phase of the planting campaign. Plantations which were established when the buds had not yet budged usually suffered greater losses than those which for some reason were planted when the buds had almost opened. It seems that with the swelling of the buds the roots develop the ability to draw water from the soil. As a matter of fact the green douglas usually flushes 10-14 days later than the grey or blue type; that means that losses in case of a too early planting of nursery stock from mixed seed will mainly affect the green type and thus lead to a negative selection.

I have mentioned this example as quite an amount of the douglas seed which we receive from the U.S. is mixed seed, and unfortunately it is impossible to tell the difference by the seed.

Douglas cultivations which were established in autumn did not do too well. There were in many cases heavy losses or complete failures. And, we think, the reason for this is that the summer growth was not entirely finished yet when the young trees were lifted and transplanted. Therefore plantations in late summer or early autumn should be limited to cases where quickest transport and immediate planting are possible.

The most common way for the planting itself is the hole-planting, especially if we have to do with 3-year-old plants. The soil has to be dug on a surface of about 16 inches square and it is just as essential to prepare the hole deep enough. Mattock and spade are the proper tools. Loose soil around the root system will favour the growth of the young plants, especially on heavier soils. The intensive cultivation will also ensure that weeds do not come up in the first period; this is quite an advantage as hardly any other tree suffers as much from stripping of the bark, which might easily happen when we weed the cultivations. Later on, of course, when the plants are more sturdy it has to be done from time to time.

Sometimes the weevil attacks douglas plantations, but serious damage can be avoided by spraying. Hylarsol, a German spray, has proved to be most efficient. In districts with roe or red deer the whole cultivation must be fenced in and where douglas is planted singly or in groups the young trees have to be protected singly by hoses of meshwire.

Thinning and Pruning.

The first thinning should be carried out rather early. All dead and suppressed trees are taken out.

Differently from a first thinning in a pine stand we do not so much extract the smaller trees as with douglas they are the best future crop trees.

The early extraction of crooked, bulky and "noddy" trees is especially important to favour the surrounding specimens which are thin, straight and clear. This first thinning, in fact, is decisive for the whole further development of the stand. As to the cost of these thinnings all expenditures have been repaid by revenue from selling the green branches for which there is the greatest dmand all over Germany. We have had an average net income of about £45 per acre from those sales.

I have already mentioned that douglas has to be pruned, even in pure stands which are established in a narrow spacing. The procedure is best done in two phases : firstly to a height of 15-18 ft. and secondly —after some years—at least to a height of 30 ft. Roughly 100 trees per acre should be selected. W have developed special light ladders for this purpose the highest rung of which is a rope. The cost runs up to about £3 per half acre and also these expenses are mostly covered from the sale of the green branches.

Douglas tolerates pruning in the green, so there is no risk in cutting off the lower branches which have already developed shade-needles.

The later thinnings should be repeated rather often and moderately with the main aim to allow for a full development of the crowns. If we keep the stands too dense there is always the danger of competition between the crowns and also between the roots and we have always found that stands which were badly thinned or not at all suffered severely from windthrow.

If we properly apply this procedure we come rather early to the final position of the stand, maybe at the age of about 50-60 years. At that time we shall have 120-180 stems per acre, which are all pruned and which have been for long treated as future crop trees. There are no objections to leaving these stands for 4 or more decades. The American yield-tables prove that on favourable sites douglas might gain an increment of 80 cu.m. per acre between the age 80 and 100.

In South-Western Germany where many of you have seen the thrifty

growth of silver fir and spruce conditions are somewhat different. There from the age of 70 years on douglas is overgrown by these two native species, so that we have to try what other exotic species we may successfully mix with it.

Seed Origin.

All our experiments and experiences with douglas have proved the great importance of seed origin. A classical experiment had been carried out in Forest District Kaiserslautern in the Palatinate where in 1910 experimental plots were established with 10 different provenances. Only one out of these 10 provenances, the one from Snoqualmie, has shown good results while most of the rest were a complete failure from the economic point of view.

In 1954 the OEEC in Paris has tried to find a way to make sure that the American Forest Service provides bonded seed to cover the demand of the European nations, but also this combined effort did not have much success, so that we from our German side sent an expert to Oregon and Washington in 1955. This forester has selected 31 seed-production stands in the douglas region of these two States and we have arranged with the American forestry authorities and seed dealers that we shall preferably get our seed from these stands.

The Wood.

The wood of douglas varies widely in colour, grain, texture, strength and working qualities depending on the age of the tree and the locations in which it is grown. In Western Oregon timber from rapid-growing, immature trees is wide-ringed with a wide band of dense summer wood, of more or less uneven texture and reddish orange in colour, a characteristic that has caused timbermen to call the wood red fir. Older stands are classed as yellow fir forests. Since the rate of growth diminishes with age the trees in old forests are likely to contain a relatively large proportion of yellow wood. Both kinds of wood may be in the same tree, the coarse-grained centre being reddish and the fine-grained outer portions of the stem yellowish. The yellow-fir is considered more desirable because of its colour, fine grain and easy-working qualities.

Douglas wood has a specific gravity of 0.45, is very strong, stiff, high on shock-resistance and durable. These properties, together with availability in exceptionally large sizes and high quality make it an excellent structural material. Its greatest use is in the form of dimension timber, ship and bridge timbers, piling, railroad sleepers, cross arms and pit-props. Because of the large size of logs and amount of clear volume it is an outstanding veneer-wood and large quantities are manufactured as plywood. Other important uses include sashes, doors, flooring, Venetian blinds, general millwork, cooperage and silo and tank staves.

A considerable volume is used for sulphate pulp. In the last war

¼ of the aircraft material that was produced on the West Coast of the United States was of this species. Other important products for war use included pontoon timber and ship decking.

There has always been a special demand frim factories which produce accumulators where it is used for insulation walls.

In the past few years the bark has been utilized for the production of wax. All these technological abilities have made douglas timber No. 1 of the World.

Of course, not every European timberman is convinced of this fact yet. I still remember when some years ago one of my customers, a very smart saw-miller, refused to buy one douglas log which was right in the middle of a large spruce lot, which he had bought at an auction. We had a very long debate in which I found out he could not even pronounce the name of the tree and somehow he felt cheated. It took all my skill to persuade him to take this log as it could not be hauled out by another buyer. Some time later this saw-miller showed up again with the brightest smile. He wanted to thank me that he had got the tree. He had personally used the boards for the manufacture of some very stylish furiture for his home, which were extraordinarily attractive and solid.

So, not only we foresters, but also the timbermen have to learn a few more lessons before we really know enough about douglas, its silviculture and its utilization.

I am very much afraid that my limited time does not allow for further remarks on this species therefore I had better proceed to some other tree species which are native to the West Coast of the U.S. and which also show great promise for our European silviculture.

Tsuga heterophylla.

First of all, there is western hemlock (*Tsuga heterophylla*). From the standpoint of volume it is the number three species in Oregon after the yellow pine (*Pinus ponderosa*). Commercially it is rapidly gaining importance as new and wider use is made of the wood. Over the period from 1925-1941 hemlock has shown a greater increase in volume of sawlogs produced in Oregon than any of the other major species.

In mature forest-grown trees the boles are clear with little taper, usually 3 to 4 ft. in diameter breast height and 150 to 175 ft. in height. Trees up to 8 ft. in diameter and 200 ft. in height are sometimes found. In its favourite habitat, the coastal fog-belt region, western hemlock is one of the most rapid growing conifers; here it forms dense stands of unusually high yield. Hemlock is a prolific seeder and frequently re-stocks cut- and burned-out areas on which the former stands were predominantly douglas. The native range of this tree reaches from Alaska down to Northern California and in a more or less wide strip from the Pacific Coast up to the Western slopes of the Cascade Mountains.

In Canada it is found at elevations of 6,000 ft. The best stands grow in the moist Coast Region around 3,000 ft. above sea level in Oregon, Washington, British Columbia and Alaska. It is accustomed to moderate temperatures with little fluctuation throughout the year. Different provenances were found which differ in their resistance to frost.

Hemlock is very tolerant to shade, much more than any other tree species of the Pacific region. On the other hand it regenerates easily on bare soil without shelter, growing up in pure stands. It grows best with high precipitation varying from 64 to 80 inches.

Soil requirements are not too distinct provided there is enough rainfall or air-moisture. Higher volume yields are obtained from wet and cold sites in middle elevations. On site I and II the tree will reach a height of about 120 ft. and a breast-high diameter of 20 inches at the age of 100 years. The tree forms extensive even-aged pure stands but also appears in ideal mixture with douglas, *Thuja plicata* and some other conifers.

The thin bark makes the tree suffer from sun-burn, therefore sudden exposure has to be avoided. The same holds true for its susceptibility to wind-throw which is caused by its shallow root system, and due to these factors ground fires are usually fatal. Two insects are rather detrimental : the hemlock looper (*Therina somniaria*) and the bud-borer (*Peronia variana*), but both these are still unknown in Germany.

Young plantations are browsed by game and pole stands may be peeled if they are not protected.

Older trees are often infected by a fungus (*Echinodentium tinctorium*). Some of our young cultivations have suffered from snow-pressure and near Weinheim a 20-year-old stand of *Tsuga* was completely destroyed by snow-and ice-break in 1936.

Now, you might object that all these facts do not recommend any further cultivation of *Tsuga* in Europe. But in truth all these disadvantages together are less than those from which our native species suffer. For spruce, for instance, I could list a much greater number of dangerous agents, pests and diseases and yet we have not given up growing it.

But let us try to find out now what are the advantages which *Tsuga* offers.

It regenerates easily. Its great tolerance to shade makes it an ideal tree for underplanting stands of other species. If grown under an older stand it will surround the other trees so densely that these trees will develop straight clear boles. Experiments in Germany, Denmark and Holland prove that it grows exceptionally well even on poor heather soil near the sea-shore.

Tsuga wood is somewhat less valuable than that of douglas. It is

moderately strong, light in specific weight (0.38) and has good working qualities. It is generally straight- and even-grained, light in colour—from a yellowish to a purplish tinge. The long fibres of the wood and its freedom from resin make it an excellent pulpwood—the principal use of this species to date in Oregon. The wood machines well and considerable quantities are sawn as siding, ceiling, flooring and casket stock. In construction work it is used for all but the larger sized timbers. In the last war select grades of timber of this species have been found satisfactory for aircraft material. Box-factories claim that the wood does not hold the nails too well, but at the same time they praise the fact that the timber is absolutely odourless and so, it is mainly used for food boxes.

The timber does not split too well. The American pulp mills therefore split their pulpwood by screwing a cartridge into the log thus blasting it to smaller pieces. The bark of *Tsuga* contains 15 per cent. tanning acid so that this by-product even might be used for tanning purposes.

The paper manufactured from hemlock is a bit thicker than spruce paper. It has a very high content of Alpha-cellulose which makes it quite suitable for the production of artificial silk. In fact great quantities of*Tsuga* sulphite go from the U.S.A. to the silk-weaving mills in Japan each year. Newsprint is a bit reddish in colour, that is why it is only used by provincial newspapers.

Unfortunately we do not know much yet about the right seed origin. We hardly have any of our own stands that could make us self-supporting in our seed supply. And seed production in a *Tsuga* stand starts rather late, usually not before the age of 60. So we are still depending upon the seed deliveries from the United States. We seem to have found out that provenances from Southern Alaska and British-Columbia show greater frost resistance than other strains. In Norway, for instance, they were not damaged by heavy frost.

On dryer sites (interior continent and mountainous locations) we should try out seeds originating from the Rocky Mountains and Idaho, but where the rainfall is less than 30″ all experiments will be in vain. It would be a false conclusion if we would earnestly try to grow two-storied mixed forests of douglas and hemlock like the ones we find in the U.S. This will be out of reach for our shorter rotations.

But by all means should we use hemlock as a serving species and not only in douglas stands, but also in mixture with spruce, pine, oak, beech, birch and larch. Especially with pine and oak we have two fine sample-stands in Oldenburg where 20-30 year-old stands of scots pine and oak were underplanted with 3 year-old hemlock in 1932.

About 450 hemlock were planted per acre. Now, only 25 years later, the hemlock makes up about 20-30 per cent. of the total volume of these stands, in other words: the volume of these stands has been

increased by ¼ to ⅓ by bringing in hemlock. I must mention that in both sites there is a rather high groundwater level—4 to 5 ft. below the surface.

Some German foresters recommend hemlock for filling openings in spruce pole-stands which were damaged by snow-break. This method may lead to higher financial yield of the final crop as the *Tsuga* may be sold as valuable pulp-wood. The procedure should be limited, however, to spruce-stands the ages of which do not exceed half the length of their rotations.

As a rule *Tsuga* prefers northern aspects and not too basic soil. It germinates better in humus soil than on mineral soil which is important for selecting the proper seed-bed. I may finally mention that if *Tsuga* is sown or planted somewhere it should be *Tsuga heterophylla* and not *Tsuga canadensis,* its sister from Eastern America which remains a much smaller tree and has less commercial value. The latter's usefulness is almost limited to pulp-wood.

Thuja plicata.

I shall come now to the third species of the American conifers which deserves the attention of European foresters. It is *Thuja plicata,* red-cedar or giant arborvitae. Red-cedar is a forest tree, attaining a height of 200 feet and a diameter of 15 feet, with a trunk tapering from the base and often strongly buttressed.

The tree is native along the north-western coast of North-America from Alaska to Humbolt County, California, and eastward in British Columbia, Northern Washington and Idaho to Montana. In elevation it goes from sea-level to 4,500 ft. in the Cascades and even up to 6,000 ft. in the Rocky Mountains. Along the coast as well as in the interior continent it prefers fresh sites. It is one of the most tolerant trees to shade but grows also well in full light.

The coastal type grows best in the fogbelt along the Pacific where it profits from the comparatively high air-moisture and good stands are mostly found on shady aspects or wet gorges. The yearly precipitation in its range varies from 20 to 120 inches.

Its requirements in regard to soil are rather vague but sufficient soil moisture is important. In the interior of British-Columbia it even grows on swamps and in the flood area of the rivers.

The first red-cedar was brought to Europe in 1796. From an inventory which was carried out in Germany in 1951 we know that red cedar grows in at least 49 locations all over Western Germany. It did not suffer from our coldest winters and did not die during our hottest summers. We know nothing about the seed origin of these stands. Moreover it is seldom thrown by the wind as the root system stretches out far around the tree.

The first growth of the tree is a very slow one, so slow that it is surpassed by all other European species but this tree has patience, it knows it will be the final winner.

The dense crowns of the stand prevent any undergrowth. All you find on the ground are the tiny shoots which it casts and renews every year.

The tree has few enemies. Even the game does not browse on it.

In an article of R. L. Robinson "World Forestry Congress 1926" I found the statement that in Ireland red-cedar is heavily infested by a fungus *"Keithia thujina."* We have not noticed this fungus on the continent yet. According to another report from Denmark *"Thuja* has suffered from a fungus *Didymascella thujina."*

The giant *Thujas* in the virgin forests of the United States are always infested by red-rot, caused by *Fomes annosus, Trametes pini, Polyporus Schweinitzii,* etc.

In many respects the silvicultural behaviour of *Thuja* is similar to that of hemlock. Both species are extremely tolerant of shade and yet grow in full light. Their requirements as to the soil are rather vague, but they thoroughly open up the soil, especially in the upper layers. Examinations of the litter of douglas, spruce, hemlock and red-cedar showed that the litter under a red-cedar stand decomposes rapidly and has the highest proportion of bases. In a 66-year-old sample stand of *Thuja* in Harzburg I measured an average thickness of the needle-litter of only $\frac{1}{2}$ inch and a volume of 33,600 board feet per acre. Both species seem to be very suitable substitutes for our silver fir where summers are too cold and winters too warm, where the complex phenomenon of silver fir dying is acute and where repeated infestation by *"Dreyfusia Nüsslini"* makes silver fir management dubious. Sometimes, silver fir fails in our country due to numerous droughts within a short period. Also in such cases hemlock and red-cedar are of some promise as they are used to less summer rain.

The growth and development of red cedar depends greatly upon its position in the stand. The dominant trees usually taper extremely, whilst co-dominant *Thujas* as a rule develop more cylindrical boles. Moderate high-thinning will therefore be the proper treatment and will also diminish the danger of snow-break which sometimes occurs in spite of its spindle-crown.

When stands of pine, spruce or other species are to be underplanted by red-cedar these stands should be heavily thinned. Up to $\frac{1}{3}$ of the trees may be removed so that no further fellings become necessary for quite a time.

Wherever possible and where the necessary seed is available hemlock and red cedar should be mixed. Also in their home country they form a unit. They complement each other in many ways. Their natural range

is about the same and where this natural mixture at present appears in Western America it is not so much a result of tremendous forest fires or natural catastrophes but a true climax-type. As a matter of fact some European foresters do not like the red cedar for aesthetical reasons. They call them the "cemetery trees of Skutari." I like to remind these people that *Thuja* played an important part in our prehistoric forests all over Europe, and that it is extinct since the glacial periods only, which latter is the main reason for the fact that our forests of to-day consist of so few tree species.

As to the technological properties of *Thuja* they are numerous and excellent. To the old Indians in their virgin forests it was the most important tree. They used it for building their canoes, totem-poles and potlatch-houses. The interior bark was used for weaving ropes, nets and blankets, and in case of emergency it even served as food. Also the first white settlers exclusively used *Thuja* for their buildings, at least until such time as they had sawmills. We know that without sawmills they made split-boards of 9 ft. long, 16 inches wide and $\frac{1}{2}$ inch thick. Even now-a-days 90% of the shingle roofs are made from red cedar wood, for there is no better species for this purpose. Another outstanding property of this wood is its durability. Without impregnation it stays sound and healthy in the soil as well as in the open. Fence posts and telephone poles rot much less than even impregnated poles made from other species.

So, we have the queer fact that the dead wood is more resistant to rot and decay than the living tree. Swedish scientists claim that this rot resistance is due to a very efficient poison in the cells of the wood which even in weak solution works as a fungicide.

The wood of western red cedar is not only very light in weight but also extremely tough. The U.S. sailing yacht which took part in the Olympic Games in 1936 was built from *Thuja* wood which is a well-liked material for racing boats. The wood hardly shrinks nor does it swell, if exposed to rain and moisture. It is therefore the ideal raw material for window frames, frames of greenhouses, and venetian blinds. The strong scent has the effect of a moth repellent which means that lockers or drawers made from it are protected against moths.

Some of the American red cedar wood is used for pencil-slat stock. In Germany it filled this purpose only during the war, when the customary imports were not available. In my forest district I have reached the highest prices in selling the wood for fabrication of ladders and wagon shafts. Who ever worked with a light red cedar ladder will never like another one.

Sitka Spruce.

The fourth species of American conifers on which I want to comment is sitka spruce (*Picea sitchensis*). Sitka spruce in Oregon is limited to the narrow fog-belt of the coastal section and for a short distance

inland along the lower Columbia River Valley. Because of its 5 billion board feet of merchantable saw-timber, its thrifty growth characteristics giving high yields on relatively short rotations, and its excellent timber qualities and specialized uses, this species is considered one of the more valuable in the state.

Sitka spruce likes fresh summers and mild winters or oceanic climate in other words. It goes up to elevations of 800 ft. and wherever it grows air-moisture must be high. In exceptional cases, for instance on the northern slope of Mt. Rainier in the State of Washington it grows even at an elevation of 5,400 ft. The tree is tolerant to shade, though not to the same extent as hemlock and red cedar. It recovers even after a long time of suppression.

The seedlings can stand a very high degree of shade if there is enough moisture in the soil. In its later years the tree requires full light for rapid growth. It is used to a precipitation which varies from 75 inches to 150 inches and this rainfall is fairly evenly distributed through the year except during two dry summer months.

If soil- and air-moisture are high enough it grows also with 25 inches of rainfall, but it does not like soils with stagnant water.

The less moisture there is in the soil the more distinct are the requirements for minerals. It regenerates easily on limey soils which on the other hand does not favour the regeneration of hemlock as the latter prefers rather acid humus for its germination.

Sitka spruce mostly occurs in mixture with red cedar, *Abies grandis, Tsuga mertensiana,* lodgepole pine (*P. murrayana*) and *Sequoia* in the South. Pure stands seldom exceed the size of 2 acres.

It is rather resistant to wind throw; the great storm catastrophe on the Olympic Peninsula in 1921 which destroyed extensive sitka-spruce stands was caused by a hurricane. The tree has no dangerous enemies. Quite different from norway spruce it is hardly ever attacked by *Nematus abietum.*

Some old stands were damaged by *Dendroctonus micans* in Holland in 1935. On too dry soils it is liable to suffer from *Agaricus melleus.*

Due to its sharp-pointed needles it is less browsed by the game than other conifers.

Some of our young sitka-spruce plantations suffered from frost during the tough winter 1928/29. Especially the predominant plants which were not covered by snow were killed. But according to all evidence this misfortune seems to have been the result of bad provenance.

The Forest Research Institute in Bergen/Norway has established sample plots with 49 different seed provenances of sitka-spruce. Their main result was the fact that all origins south of the 52nd parallel of latitude were not suitable for Norway as they suffered too much from frost.

I am quite sure that the cause of most of our failures with sitka-spruce was that we chose the wrong climate site. Where the special requirements of this tree were met and where we worked with proper seed origins we have had outstanding results. The yield was about 60 per cent. above the yield of norway spruce on Site class I.

About 20 years ago the British Forestry Commission published its findings on the silvicultural treatment of sitka-spruce. Some of these results confirmed our own experiences.

For instance; larger seeds have a higher germination than small ones, and 1 year-old seedlings are easily damaged when weeded. On the other hand the little plants do not like crusted soil, a fact why heavy rain might damage the seed beds. 6 mm. have been found to be the best depth for sowing, a heavier cover of soil affects the germination very markedly. A cover of straw mats is desirable as a protection against intensive sun light in the summer time, it may even be left in the winter to prevent frost damage. The ideal spacing for transplanting is about 2 by 10 inches.

The properties of the wood make it particularly desirable for special uses. Because of high strength in relation to weight, and even, straight grain, it has been extensively used for aircraft material. The wooden parts of the famous plane "Spirit of St. Louis" in which Lindbergh crossed the Atlantic were of sitka-spruce. Nearly all of the spruce stands of the Pacific fog belt were searched for trees suitable for aircraft during the two wars.

The wood is well suited for pulping and most of the thinnings of smaller dimensions are used for this purpose. Other important uses include boxes and crates, planing-mill products, musical sounding boards and boat timber.

The specific weight of the wood is 0.41. The fibre is about $3\frac{1}{2}$ mm. long. The pulp has a greyish colour, therefore it is not first-class pulp.

The British Forestry Commission published a provisional yield-table for sitka-spruce in 1952.

According to its figures sitka-spruce reaches 10 per cent. and more in volume than even douglas on equal sites.

I have tried to sum up some of the findings which we experienced in our work with conifers from the American West Coast. I assume that, like me, you will have the impression that we European foresters must learn a great deal more before we can really say we are experts in this field. We have to admit that many results are still contradictory. This is mainly due to the fact that in very many cases we know nothing about the seed-origin of our stands or trees.

The information gained from various sample plots have been very helpful, of course, and we have also learned a great deal from American literature. Numerous European foresters were able in the last decades

to have a personal glimpse at the natural stands of these conifers in their home country.

But all this is not enough. We should carry out more and more *provenance experiments,* as has been described by different authors like Fisher, Yates and Edwards. Seed collections should be made from selected stands and these stands must be very fully described. Full records of collection, seed testing and grading are needed. In the nursery stage, plants must be raised in well-designed experiments and methods of selecting and rejecting plants have to be developed. In the forest stage, the shape and size of the plot must be suitable for comparison of crops and not only individuals. Various methods of spacing, planting, beating-up and thinning need to be determined.

At the same time we should not neglect our contracts with foresters and seed dealers in the U.S., though time is working for us in so far as our seed demand from them is going to be more specified. As clever businessmen they will realise in the course of time that they must improve their standards and produce bonded seed if they want to keep their market. Some of them have already adopted proper methods in that regard.

Finally there is hope that for the future some of our seed demands may also be met from graft-plantations which might produce desirable seed of these exotic species. As you all know the field of forest-genetics is a rather new one, but all progress accomplished so far, is really encouraging.

We must be aware that very many of our findings will not hold true permanently, but are only of temporary importance. Changes on the market or new ways of utilization might overthrow them very suddenly.

But we foresters should never capitulate to this problematic uncertainty to which we are so used in our profession. We should rather tackle the task from the optimistic side in the spirit of a famous German forester, Dr. Carl Schenck, who once said : "It is the charm of forestry that we know nothing about it."

Growing Saleable Timber

By MALACHY SHARKEY *

THE prime purpose of forestry is the economic growing of trees for the production of timber. The Forester (and in this article he represents all those engaged in or responsible for the growing of commercial trees) must never lose sight of this fundamental fact and all his efforts must be relentlessly directed towards its attainment. I emphasise this because the practising forester is so preoccupied with normal day-to-day routine work that this primary objective could easily be lost sight of, while the long interval between planting and harvesting the timber crop tends to further obscure the issues. The forester must guard against these inherent dangers, which are further increased by the fact that in present-day forestry activities, especially in those controlled by the State, the trend is towards specialisation in different aspects of forestry with collective rather than individual responsibilty—all within a veil of anonomity peculiar to a State service. Moreover the forester's education and training, however complete, tend to concentrate on the growing of trees through the study and manipulation of the natural sciences, until the danger arises that the growing of trees becomes an end in itself somewhat divorced—as indeed is the environment of the forest—from the more hard and prosaic facts of the economic utilisation of the timber crop. This is not to detract from the technical merits of our foresters or to say that the forester must take short-cut methods in the practice of his profession or become entirely preoccupied with matters of utilisation. It simply means that the forester not only grows timber but must grow good quality timber, always envisaging the end product and maintaining a constant economic awareness with the merits of his activities measured by a 'will it pay' yardstick.

Background to Problem.

Production of timber is subject to all the economic laws applicable to production of any other commodity even though the commodity in this case is basically a raw material. The severity of the economic test which timber growing must withstand is further aggravated by the fact that timber is an international material, enjoying for the most part free universal markets, with its price structure moving within defined ceilings. In this setting the forester takes on the responsibility of producing an important material at an economic cost in a quantity which will meet anticipated demand and of a quality which will satisfy an exacting public. Moreover, he is further obliged to render a satisfactory sales service and to present his produce in a manner which will encourage consumption and thus ensure his own economic survival.

This is surely a formidable undertaking for a forester—whether State or private—although quite definitely the obligation is more exact-

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ing for the State Authority in so far as it is working in public trust—financed from public funds, and therefore carrying a heavier responsibility for the efficient fulfilment of its complex task.

It must be recognised of course that the forester is subject to circumstantial limitations in the pursuit of his ideal towards quality at low cost. First of all consideration of site and soil suitability determine to a large degree his range of species, although on this point one could enter deeply into arguments on the merits of planting unusable or low-value species or afforesting unprofitable land. As well the length of rotation required for the production of commercial timber precludes the possibility of an apt analysis of consumer requirements, as to some extent fashions in timber usage change.

Compelling Circumstances.

These circumstances however in no way absolve the forester from pursuing a high quality code aimed at securing long-established timber quality features such as low knot-content, straightness, high form factor, high ring density in softwoods and general suitability. Rather do they necessitate an all the more conscientious effort to ensure that the anticipated requirements of the future will be fully met so that the produce of the forest will be saleable. Nor is it relevant to state that the trend in usage is towards reconstituted forms of wood with the heterogeneous composition of timber reduced to the homogeneous matter of the modern pulp, fibre or chipboard. In fact the increase in production of synthetic board mainly comes about from technical advances in the utilisation of forest "waste"—thinnings, sawmill slabs, and tops and branches of both hardwoods and softwoods—and be it noted that from 1912 to 1956 the total world exports and imports of sawn softwoods has risen from 5,381,000 standards to 6,061,750 standards, despite competition from substitute materials. Even allowing for maximum development of pulping and other forms of synthetic timber processing it would be the height of folly to convince ourselves that the defibrator has solved the economic problems of Irish forestry.

In any case the national and international price structure of general timber and pulpwood necessitates the discriminate channelling of graded produce to the most profitable outlets. The prospects of getting an economic price for low-grade timber of saw-log size sold as pulpwood cannot be entertained nor can it be assumed that the selling price of the better grade saw-logs will profitably carry, or in other words subsidise, the unprofitable disposal of large quantities of lower grade forest logs.

Quality Facts.

Perhaps one should further qualify this responsibility for aiming, where possible, at quality by admitting at the outset that large areas of our forests will never produce anything but low grade timber, or timber

doubtfully marketable other than for pulping and low-priced usage. An immediate eliminating factor in this respect is the question of tree species. For instance it is difficult to envisage such species as contorta pine or japanese larch being commercially acclaimed in an easily saturated market or a highly competitive international market, while others of our presently-favoured species such as the silver firs and some of the pines, may not find an easy clearance in the sawn timber market. A particular species may have much individual merit in its timber qualities, but ts selling prospects must be realistically viewed in the light of all the circumstances which are likely to prevail at the time of its wholesale marketing. For instance the present exclusive demand for homegrown spruce ominously illustrates this point with the prospect that the more plentiful spruce becomes the more difficult it will be to sell other species. It therefore must be accepted by the forester that in order to ensure even reasonable prospects of economically marketing all his produce, he must keep a keen eye on the overall 'supply and demand' structure which obviously dictates that high quality in the timber intended for sawmilling is a challenging obligation.

Arising from Irish climatic and growth conditions we must also from the outset recognise that Irish timber will always carry certain inherent disadvantages due to its more rapid growth, relatively wide ring growth and consequently lower density, high moisture content at the pre-milling stage, a tendency towards coarseness, and comparative immaturity even at the end of its rotation. Since sawn timber mainly retains the qualities of the tree whence it came it is incumbent on the forester to eliminate as many as possible of these defects or to compensate to the utmost for the defects which he cannot eliminate.

From the beginning the forester can influence the quality of his produce commencing with the selection of the land, choice of species, density of spacing, thinning, pruning, and length of rotation.

Selection of Land and Species.

In selecting the land for planting, the forester must be satisfied that all the land will at least produce an economic crop and that a reasonable proportion of the land is of a type which will produce high quality timber. Similarly the trees selected should be of a species which will produce quality as well as quantity. While of course the forester must, to a large extent, be guided by silvicultural considerations in selection of species, he must always display a keen appreciation of his obligation to make forestry pay by tempering matters of silviculture with a strong leavening of commercial considerations. It is at this stage that the forester displays his business sense and sets his productivity gauge which determines the final financial success or failure of his enterprise,—even though he himself may not be present at the final reckoning.

Planting Distances.

Density of planting spacing has a far-reaching effect on quality and indeed it is difficult to understand how wide spacing can be justified under Irish growth conditions. At best it must be regarded as a matter of short-sighted expediency. While there are less transplants required per acre at 6 foot or 7 foot spacing there are also less prospects of a future quality crop. In the final analysis the unit of measurement of timber is not the acre but the cubic foot—the value of which will be greatly influenced by the quality.

The ills of wide spacing are all the more serious due to the fact that the temptation to save transplants is strongest when planting good-type land, which is relatively in short supply and which should be regarded as our main reservoir for growing quality timber. On the whole these soil types are generally accessible so that the argument of unsaleable thinnings cannot be sustained, especially as there is a good prospective demand for thinning produce. There is no need to go into detail on the results of wide spacing; suffice it to say that wider ring growth and heavier branching are encouraged with a tendency towards lower-grade stem formation and general roughness. While no doubt branch suppression would commence when crowns eventually meet, the age at which pruning can commence is delayed and the smaller number of trees per acre will unfavourably affect the range of selection in thinning. There is no saving in the long run with wide spacing as every forester knows and if we are to emulate the efforts towards quality of timber exporting countries we must adhere to spacing rules which are internationally recognised and which create growth conditions more closely aligned to those of the world's virgin softwood forests whence the bulk of high grade timber comes.

Thinning.

The merits of heavy and light thinning have been more keenly debated in recent years than any other forestry subject and the diversity of opinions—each convincingly substantiated—(if this is not a paradox) proves beyond doubt that in this important matter we have not yet left the 'trial and error' stage. An acceptable generalisation is that heavy thinning tends towards low-quality timber and that light thinning helps quality—though here I must leave the terms "heavy" and "light" undefined. In any case the forester must not be carried away by the bountiful prospects of early heavy returns through heavy thinning at the complete expense of quality. Knot-content and ring density are the most important quality factors in sawn timber and are mainly influenced by the grade of thinning. What merits has a large tree with two rings per inch, rapid taper, heavy branch supply and general coarseness?

In converting there is heavy waste due to taper, with a tendency towards cross or short-grain in the sawn scantlings, while above the first 15 feet of bole the timber is hopelessly rough. Heavy knot-content and

low density are particularly harmful when artificial drying by kilning is practised, resulting in knot holes, twisting, and sometimes cellular collapse and in our moist climate drying timber by kilning must be regarded as an essential part of processing for future wide scale consumption. From my own experience a much greater outturn is got from the more slender, cylindrical tree. Having grown in close formation not only are knots less plentiful but the individual knots are smaller and the clean bole is utilisable for practically its full length with little converting waste.

Pruning.

The forester's attitude towards pruning is more than anything indicative of his attitude towards quality and on no account should pruning be regarded as a nuisance operation, for while it does not increase the volume of the tree it unquestionably increases its value. While pruning may not be always essential for all species in all circumstances, even in close-grown plantations with natural branch suppression high pruning will still further improve the quality and enhance the value. Pruning should always accompany heavy grade thinning unless all prudence is to be thrown to the wind. If the forester is so rash as to adopt wide spacing at time of planting, he must more completely rely on the pruning saw for quality, while with species of naturally strong and persistent branch habit such as the pines, and to some extent douglas, pruning is always essential. The adage of "losing a sprat to catch a salmon" aptly applies to the matter of pruning where a small cost, expended at the right time, results in an ensured sale and greater profit.

The whole purpose of pruning is lost if it is not carried out in time, that is before the tree is more than 4 inches or 5 inches diameter, as the aim is to produce a tree so that its longitudinal section will have as large an area as possible free from buried branch stubs, which in the sawn timber appear as knots. Pruning of trees a few years before sale or when the tree is more than 6 inches diameter is merely a form of deceptive window-dressing which in the long run militates against the forester's best interests, helping as it does to perpetuate a prejudice against Irish-grown timber, and indeed cancelling out in advance the possible sales appeal of genuinely pruned timber.

High pruning (up to 20 feet) at present costs about 4d. per tree, which, if commenced before the crop is 25 years old (on selected final crop trees only) amounts to approximately 2/8d. per tree at 5% compound interest to the time of felling. In an average tree of 50 cubic feet the first 20 feet contains approximately 50% of the total volume so that the additional cost of pruning is little more than 1d. per cubic foot—surely a small cost which will be profitably recouped.

Length of Rotation and Log Size.

Length of rotation not only affects production costs but also has a bearing on quality, selling prospects, and selling price. To ensure an economic return from his investment, the forester must sell his timber at a suitable age and size, the determining of which is not a mere chance or arbitary matter, but rather must be governed to a considerable extent, by the customer's requirements. Without pretence to fully appreciating the relationship of age of tree to density of the timber, it can be generally accepted that the timber from the mature tree is superior to that from the very young tree with a progressive variation in important quality features relative to the age. The timber from over-aged Spruce however has a tendency to brittleness while the length of rotation is a serious quality consideration where there is a danger of attack by heart-rot fungi.

Provided a tree is of millable dimensions and reasonably mature, size as expressed by diameter or girth has little if any influence on the quality of the sawn scantling,—timber from rougher central core excepted—but a uniformity in size with logs running 12 inches to 20 inches in diameter is preferable to over-sized logs which impede economic handling and conversion.

Quality Pays.

The question is sometimes asked "does it pay to grow quality timber?" Apart from the fact that quality is an initial requirement to ensure reasonable prospects of wholesale marketing of future timber crops, the forester must realise that quality is a positive selling factor, expressible in higher price per cubic foot—a price differential which in the end may prove a decisive item in the forestry Profit and Loss account.

The effects of quality extend far beyond the forest ride or sawmill yard. It affects the costs of the box manufacturer, or building contractor, as reflected in the time variations of a carpenter sawing or driving a nail through knotted or otherwise rough timber. Similarly with planing or painting a soft or absorbent surface, while the consequences of splitting, warping or collapse must also be considered. Even in less exacting timber outlets, quality affects handling costs to an unsuspected degree. Pitwood preparation and grading cost less if the quality is right. Even in the mines the cost of handling and erecting a good-type pitprop is less, not to speak of its durability. In the pulp-mills the cost of peeling and grinding straight cylindrical billets of small knot content is lower, with less wear and tear on the machine parts and a higher quality pulp resulting—all helping the sales prospects on a competitive export market. Moreover, the density of the pulpwood is of major economic importance as production costs are greatly affected by the relationship of fibre to moisture. Similarly with fibreboard, chipboard and woodwool manufacture. There is no need

to stress that all these factors react on the sale price of the standing timber.

Private Forestry.

In all this lies a special opportunity for the private forester and estate-owner whose planting enthusiasm is sometimes dulled by the questionable prospects of selling his timber in markets probably glutted with State forest produce. The fact that he generally has a better soil-type, capable of growing in quantity more readily saleable species such as spruce, hemlock or ash, supplies an initial advantage which can be confidently exploited by keen management and silvicultural practice aimed primarily at quality.

Conclusion.

To my mind the idea of quality in timber production needs constant reiteration as it is our attitude to matters of quality, production costs, and marketing methods that determine whether forestry is paying or whether it is just another subsidised industry. The greatest dilemma which plagues the business manager is the prospect of over production or the accummulation of unsaleable stocks and the forest "factory" is no less beset with these serious risks. On no account can the forester entertain the idea that what he grows must be used or develop a "take it or leave it" attitude. He must supply what the consumer wants not what he thinks he should want. Scientific research into technical qualities of timber may be essential, but the real test is the consumers' attitude. "The customer is always right" is an adage which can be temporarily ignored with impunity, in a sellers' market, but which has a more pungent significance when viewed in the light of a future buyers' market and a probable European Free Trade Area with foreign timber continuing to freely compete with our homegrown, while the optimistic hopes of clearing surplus native timber stocks by exporting, run the risk of being soberly shattered if we cannot compete on quality and price.

Essay Competition

This year again a sum of £15 was donated to the Society by Irish Forest Products Ltd. for educational purposes. The Council allocated the money for the subsidising of the attendance of a student member at the annual study tour.

An essay competition confined to third year students at the State forestry school, Shelton Abbey, Co. Wicklow was held as a means of selection.

The adjudicators divided the prize between Michael P. G. Harbourne and John J. Kearney.

The case for Insignis Pine in Irish Forestry

By GERALD SCULLY

WHILE nobody will deny that tree planting must be a permanent function and duty of the State in most countries to-day, there is, nevertheless, an increasingly evident tendency to regard forestry, particularly on the better sites, as another form of investment enterprise taking its place amongst so many others in their contending claims upon the capital available for national development. It is essentially a question of reconciling these contending claims in the best national interest and one of the ways which the forestry technician can best serve this interest is by the close study of comparative financial returns from the planting of the various species. One species whose potential value does not yet seem to be fully appreciated in this country is the insignis pine (*Pinus radiata*).

Natural Habitat of Insignis Pine.

The natural habitat of insignis pine is restricted to a small area on the coast of California. It is interesting and, indeed, important that a tree of such limited natural distribution should be so successful in the commercial afforestation of New Zealand, South Africa and Australia. The chief centres of its distribution in California are Monterey, Cambria and Swanton. The region is one of little climatic variation, characterised by mild winters and slight frost, the minmum tiemperature being 20°-24° Fahrenheit throughout.

The following is the mean monthly temperature at Monterey extracted from Mr. A. D. Lindsay's Report[1]

January	50.2	May	58.3	September	61.5	
February	51.2	June	60.8	October	58.2	AVERAGE
March	53.9	July	60.0	November	54.3	56.4
April	55.8	August	61.9	December	51.7	

The rainfall at the same station is 16.71 ins. annually, the heaviest incidence occurring between November and April.

A wide variation in geological and soil conditions is found within the region of its natural habitat. At Swanton the rock formation is shale with marine sandstone of miocene age; at Monterey granite and further east sandstone layers, whilst at Cambria sandstone and limestone occur. The best stands of insignis pine are found on soils derived from transported material rather than from parent rock. It rarely grows on soils with underlying rock too near the surface and soils of 1 foot—2 feet are its usual rooting medium. In its natural habitat insignis pine is of insignificant economic importance. It is preserved for scenic rather than for economic reasons. Lindsay says that it is a prolific annual seeder, with a high percentage germination. It also regenerates freely.[1]

Growth.

There is little accurate information regarding its growth in California as practically no research or annual assessments have been made there. Doctor C. S. Larsen has found a wide variation within the species with trees of 130 feet high right down to dwarf bush-shaped specimens, some of which were dead or dying. He attributes this wide differentiation to genetical factors rather than to soil or climatic variations in view of the relatively limited extent of the area.(2)

In an assessment carried out in the Cambria area Mr. L. T. Larsen found insignis pine 20 feet high with 2.5 inch D.B.H. at 5 years; 64 feet high with 12 inch D.B.H. at 20 years and 82 feet high with 18.1 inch D.B.H. at 40 years.(1)

Insignis Pine in New Zealand

Insignis pine was introduced into New Zealand by the settlers in the sixties of the last century. By 1920 its possibilities as a tree capable of making a major contribution to solving the nation's timber needs were realised. During the period of the "great afforestation boom" from 1923 to 1936 80 per cent. of exotic conifers were planted, a happy situation created by the healthy co-operation of private and State forestry. The statistics indicating the extent and the nature of the ownership of the exotic forest area in New Zealand in 1947 and the imposing contribution of insignis pine to the totals in each, make interesting reading. In that year insignis pine accounted for 48 per cent. of the 447,500 acres of exotic forest under State ownership, 91 per cent. of the 313,000 acres held by commercial undertakings and 85 per cent. of the 100,000 acres owned by farmers and private landowners.(3) The percentage of this species in private lands is a tribute to its capital attractiveness. The total extent of insignis pine plantings in New Zealand, to-day exceeding 608,000 acres, is the most eloquent possible testimony of the importance of the species in the forest development pattern of that young country.

In New Zealand it is suited to wide variety of mineral soils provided the drainage is good. The underlying rock is mainly pumice. With this tree satisfactory growth can be had up to 2,000 feet elevation, while it does well in the rainfall range of 30 ins.-80 ins.

Silviculture and Volume.

In New Zealand the seed of insignis pine is sown in the spring. The seedlings grow vigorously and their roots require frequent undercutting in order to avoid the necessity for lining out. Planting out in the forest takes place after the plants have spent one or two years in the seed bed. The yields and growth are remarkable and it is regarded by New Zealand foresters as the world's fastest-growing conifer. At 40 years it yields 10,000 cubic feet of saw-logs per acre and intermediate yields of 5,000 cubic feet of pulp wood per acre are quite usual.

There is a perceptible falling off in growth from 35 years which is apparent from yield figures given below; this indicates the desirability of early harvesting of the crop. In California the species has a life expectancy of 80-90 years.

Table I.

YIELD TABLE GOLDEN DOWNS FOREST (NEAR NELSON)[4]

Data collected from 25 plots of unthinned insignis pine

Age	Stems	Height	Mean D.B.H.	Volume cu.feet to 4 in. top diam.
5	1,200	18	2.1	—
10	1,000	36	4.9	890
15	600	57	8.0	3,420
20	370	79	11.0	5,940
25	270	99	13.5	8,360
30	220	111	15.4	10,100
35	192	118	17.0	11,400
40	173	123	18.3	12,400
45	157	127	19.5	13,200
50	143	130	20.7	13,800

The New Zealand forest service has carried out research on quite an extensive scale in the field of timber development and utilization.

The following extract from the published results of this research serves to indicate the principal strength qualities of exotic New Zealand timbers on a comparative basis : [5]

EXOTIC SPECIES

NAME	Condition at Test	Weight per cub. foot in lbs.	Modulus of rupture in bending lbs. per sq. inch	Maximum crushing strength parallel to grain lbs. per sq. inch	Modulus of elasticity in bending 1,000 lbs. per sq. inch	Shear strength parallel to grain lbs. per sq. inch
Pseudotsuga	Green	36	6,300	2,800	1,100	830
taxifolia	Air Dry	27	9,050	4,900	1,260	1,220
(Mackenzie County)						
Pinus radiata	Green	58	5,900	2,600	1,060	870
(Rotorua	Air Dry	28	11,200	5,600	1,340	1,550
County)						
Cupressus	Green	50	8,000	3,800	970	1,010
macrocarpa	Air Dry	31	10,900	5,900	1,180	1,620
(Tuapeka County)						
Larix decidua	Green	41	7,500	3,200	1,320	830
(Roturua	Air Dry	35	13,500	7,100	1,740	2,060
County)						

The test samples were in the form of small, clean specimens and the air dry values were adjusted to 12 per cent. moisture content. A study of the Table indicates that the air dry condition of insignis pine compares most favourably with the other species as far as the listed properties are concerned although it must be conceded that the strength qualities of larch are conspicuously greater.

Unfortunately, there is little information in the above as regards the radial density gradient theory : it is of importance to know the radial position in the tree, the height of the tree at which the samples were taken, the age of the wood, the number of rings per inch of the sample and the proportion of spring in relation to summer wood.

Authoritative opinion considers the bulk of the sawn timber of insignis pine sufficiently good to justify confidence in its suitability for a wide range of constructional uses, provided that it is graded properly and adequately protected from sapstain.(5)

A study of annual reports of the Forestry Service of New Zealand since 1945 gives an indication of the increasing importance of this tree in the economy and its effects upon the balance of payments. In 1955, for instance, New Zealand exported approximately $1\frac{1}{4}$ million pounds worth of sawn insignis pine timber amounting to 38 million board feet (12″ × 12″ × 1″). For 1956 it was intended to expand exports of this material to reach 50 million board feet. New Zealand's domestic consumption of exotic softwoods in the year 1954 could not have been imported at less than 15 million pounds.(6) The fact that the great bulk of this material was drawn from insignis pine stands is another graphic pointer to the rôle which this species plays in the country's financial well-being. The above facts and figures reflect the importance of this tree in New Zealand's contemporary economy and endorse the wisdom of those responsible for its selection in planting projects.

Performance of Insignis Pine in Ireland

Curracloe Forest, County Wexford.

The earliest recorded information under Irish conditions known to the writer is to be found in an article by Mr. J. J. Deasy in "Irish Forestry" in 1946. This article dealt with the afforestation of sand dunes on the Wexford coastline. It was recorded by Mr. Deasy as the second safest species to plant there following maritime pine.

Sliabh na mBan Forest, County Tipperary.

In 1948 in the same journal Mr. N. O'Muirgheasa described its performance under inland conditions at Sliabh na mBan Forest, County Tipperary.(8) Two sample plots measured in this forest in May 1957 provide interesting illustration of the behaviour of this species under Irish conditions. An arithmetic average of two plots, each of which

were one-twentieth of an acre, were taken. The plots had to be small because the belt carrying the insignis was narrow and irregular in shape.[8] The border line of trees was omitted from the reckoning in order not to inflate the volume per acre. The diversity in quality noted earlier by Mr. O'Muirgheasa is now even more pronounced and the Officer-in-Charge, Mr. H. McGuire, pointed out some stunted trees of poor form which may be due to genetical factors. Some well-shaped boles were, however, in sufficient numbers to make a final crop. Gaps were frequent resulting from transplanting failures which are usual with the species. Natural regeneration in the form of 3 inch seedlings was also a feature of the plots measured. Some data concerning growth are as follows :—

Name	Age years	Range of B.H.Q.G. ins.	Mean B.H.Q.G. ins.	Height to 3 ins. Drain feet	Total Height feet	Overbark Vol. to 3 ins. dlam. per acre hoppus feet	Number of stems per acre
(a) Insignis pine	20	3-9½	7¼	33	44	3,630	440
(b) Scots pine	20	2-4¾	3¼	14	26	925	760
(a) European larch	20	2¼-4¼	2¾	17	29	925	160

Estimated Volume removed in thinnings to date 300 hoppus feet.

(b) being mixture of scots pine and european larch.

The plots in which the trees mentioned at (b) above were measured because of proximity to (a). The quality of the pine and larch in the sample plot was, if anything, better than the average for those species on this site. Here and there the furze was cut as the poor growth of both species failed to overcome the competition from the former.

The success of insignis pine in Sliabh na mBan Forest is important as it indicates its suitability for inland sites as well as coastal regions.

Delgany Forest, County Wicklow.

Compartments 3 and 4, Belleview Property, 500 feet—600 feet elevation with northern aspect: this area contains a narrow belt of insignis pine one chain wide sheltering scots and corsican pine. Measurements of sample plots in May 1957 yielded the data set out below. Again the marginal row of trees was omitted in order to eliminate the possibility of inflation of the volume per acre.

The underlying rock of this property is of silurian formation. There is a top soil of 9ins. over a porous stony subsoil of considerable depth. The existing vegetation on the margin of this belt is mainly *Ulex europaeus* and *Holcus lanatus.* The cutting of *Ulex europaeus* has resulted in the growth of *Pteridium aquilinum, Agropyrum repens* and *Rubus fruticosus.*

Species	Age	Range of B.H.Q.G. ins.	Mean B.H.Q.G. ins.	Height to 3 ins. top diam. feet	Total Height feet	Hoppus feet per acre	Number of stems per acre
(a) insignis pine	24	5-13	9	37	46	4,215	360
(b) corsican pine	24	2-6¼	4½	19	28	1,413	510
(b) scots pine	24	2½-6½					250

Mr. Doyle, Officer-in-Charge, estimated the volume removed to date in thinnings as 500 hoppus feet.

(a) In the entire belt the largest tree measured was 15½ ins. B.H.Q.G.

It was observed from a stem analysis of one tree in the mean B.A. group that the rate of height growth was slow in the early years and that it gradually increased till it reached a maximum of 3 feet in its 7th and 11th years and fell to 1¼ feet in the last few years.

(b) The largest tree in the whole area was a corscican pine of 7½ ins. B.H.Q.G.

In the plot the ratio of corsican to scots pine was 2 : 1 approximately.

Avondale Forestry Station, Co. Wicklow.

The 1½ acre insignis pine plot here was planted between 1906 anl 1911 (beating was necessary) in a light loam on a ridge of high ground at 600 feet elevation. The underlying rock is silurian shale with intrusions of diorite and felspathic ash. The plot was planted with a 50/50 mixture of insignis pine and european larch. There was difficulty in establishing the pine owing to transplanting failures and it is recorded that some were killed by winter frost when up to 12 ins. high.

In 1949 Mr. J. J. Deasy, then Officer-in-Charge, assessed the plot and found that there were 172 stems of insignis pine with an average B.H.Q.G. over-bark of 17 ins. and a volume of 14,939 hoppus feet. In addition there were 184 stems of european larch with an average B.H.Q.G. over-bark of 8½ ins. and a volume of 2,645 hoppus feet. This worked out at 9,626 hoppus feet of insignis pine and 1,763 hoppus feet of european larch per acre. The present Officer-in-Charge, Mr. M. O'Donovan, states that satisfactory reports have been received regarding the general quality of the insignis pine timber sold from the plot, but that it did not plane well. Natural regeneration of this species seems possible in this country as here some natural seedlings 12 ins. high can be seen competing with the meadow grasses.

This plot can hardly be regarded as representative of possible development elsewhere in Ireland as it was an experimental plot on ground which was moderately good agricultural land, the use of which, for afforestation purposes, is not at present generally advocated or encouraged. Crops of the species should do extremely well and provide

an adequate financial yield on sites similar to those at Delgany and Sliabh na mBan.

In the West of Ireland some fine specimens of insignis pine were observed on limestone in Nutwood Property of Gort Forest. Their performance together with that of the referred to plots confirm the belief that this tree can be successfully grown over a wide range of soil types in Ireland provided the land is well-drained and affords good anchorage.

Climatological Data

It is intended as far as it is possible with the limited data available to compare climatological factors in New Zealand with those in Ireland. Golden Downs has been selected as it is the centre of a large insignis pine area and it is also mentioned in Table I.

Golden Downs (Nelson) Temperature F

	1951	1952	1953	1954
Mean Maximum	—	60.3	60.2	61.8
Mean Minimum	39.4	40.7	40.7	40.8
Extreme Maximum	79.0	82.7	78.5	92.5
Extreme Minimum	19.0	17.6	19.5	20.0
Number of days frost	116		90	113

The average rainfall over the above period was 52.9 ins. Over the whole area of insignis pine plantations the number of snow falls ranged from 0 to 10 in 1953. In the 1956 annual report there is mention that the drought of 1955 caused growth to be retarded to ⅓ of the level of normal years. Despite the large number of days of ground frost there is no published data on damage.(6)

Ireland.

At Carrick-on-Suir which is 10 miles from Sliabh na mBan Forest the average temperatures over 21 years were as follows: *Maximum Temperature 54.9 and Minimum Temperature 42.4. An extreme minimum reading of 20° for January and February 1957 was recorded. In January 1940 16 degrees was recorded. From 1942 to 1950 the average number of days of frost was 64. The range being from 44 days to 79 days. The minimum temperature is the more important for the Irish forester and it is recorded that plants up to 18 ins. have been killed by ground frost.

* Data supplied by the Dept. of Industry and Commerce, Republic of Ireland.

Establishment Problems under Irish Conditions.

Insignis pine which is a rapid producer of valuable timber suffers, however, from a serious disability and that is, as already implied, the difficulty in transplanting it successfully. Foresters in Ireland and Great Britain are acutely conscious of this establishment problem and many

suggestions have been put forward from time to time to overcome this disadvantage. In South Africa it is customary to plant this species in times of heavy rainfall. In the light of this practice the monthly precipitation figures for this country would appear to suggest planting during the periods of highest rainfall in October, December and January as a means of reducing the high mortality rate. It is recommended that the period between lifting in the nursery and planting out should be as short as possible—certainly not more than four or five days. If this species is to come into favour it is essential that this difficulty should first be overcome. This problem is not an easy one and the solving of it is a challenge. Tests along the following lines might yield some helpful results :—

(i) Frequent undercutting of the roots in the seed beds and direct planting in pits specially prepared in advance.

(ii) Detailed costing analysis of (i) as against the "root balled" method of planting.

(iii) A cost investigation of planting the species in soil-containers of the cheapest possible construction.

(iv) Grafting from selected trees; this method gave excellent results in New Zealand where 12½ years old trees produced five times as much wood as those derived from seeds collected at random.[2]

As regards (iii) above, Mr. W. Seymour, in his observations of the afforestation of the Schmittenhöhe in Austria noted the use of wooden tubular containers for encasing soil and roots. Should the cost of wooden containers prove too high some substitute such as plastic or tin tubing might be found equally effective for the purpose.

Land Use.

To-day the price of labour and capital is high, therefore, landowners must wisely apply these factors of production to their holdings in order to get maximum return from the soil. It is necessary for landowners to utilize to the full the various soil types and the resultant profits are the measure of the skill of this soil utilization.

Those in charge must keep in mind the supreme importance of the length of the rotation and of costings. The price which the planter will get for the final product will determine his profits after he has covered interest charges, and establishment, administrative and marketing costs. He may decide to grow a species which produces second-quality class timber with a large volume output per acre or he may decide to grow one which produces high-quality class timber having a low output per acre. The longer the rotation the more expensive the product will be. To pass on the higher price to the customer may not be quite so easy. In the world of commerce the consumer is usually master as he is the

payer. When the price of a commodity goes too high the consumer will look for a substitute. Constructional wood is being replaced by other materials mainly as a result of the continuous rise in the price of sawn timber. We must keep the price of wood down and one way of doing this is by using, if possible, species which are capable of reaching an economically utilizable size in the shortest possible time. This can be done by planting a tree such as insignis pine for constructional uses which will give saw-log timber in 40-45 years and industrial wood in 20 years. Scots pine, corsican pine and european larch which are normally planted on sites suitable for insignis pine cannot do this. Hiley proves with economic detail that in growing douglas Quality Class II to 12¼ ins. B.H.Q.G. and scots pine Quality Class III to 8½ ins. B.H.Q.G. it will cost 12.2d. per hoppus foot to grow the former and 72d. to grow the latter.(10) Even from the scanty data concerning insignis pine plots measured it is clear that we have here a species with volume production capacity equal to Quality Class II of douglas. Insignis pine has, however, the great advantage of being capable of withstanding considerably more exposure than douglas. Comparisons of the relative properties of the wood of insignis pine grown in Ireland with other conifers would be of great value.

Irish climatic conditions give advantages in tree growth in certain species over most if not all European countries. So far as this production of constructional timber is concerned it is obvious that what is required is specialization in these species and a scientific regulation of their growth in the production of timber of 14 ins. B.H.Q.G. in the minimum time.

Mr. G. R. Jacob stresses the necessity for the growing of timber to certain range sizes of less than 14 ins. B.H.Q.G. He quotes Scandanavian practice where the utilization of small diameter timber has been successfully and profitably practised.(11) If the planter wishes to obtain reasonable profits and compete keenly in the world market a short rotation and the production of timber of not more than 14 ins. B.H.Q.G. should be his aim.

Pure Planting of Insignis Pine.

Pure planting of conifers give advantages of economy in establishment and simplification of management. It is true that pure conifers in large blocks are not as beautiful as mixed woods, the former being dull and unattractive. At the same time the Black Forest in Germany owes its name to the dark colour of a few species and yet it attracts tourists.

Because of the economic advantages it is suggested that insignis pine should be planted pure. It could be a dual purpose tree in Ireland —both profitable and beautiful. In California it is retained for its beauty. It is called insignis because of its remarkable beauty in California. In Ireland belts of hardwoods could be planted through the

pure blocks for aesthetic and silvicultural reasons, providing attraction for tourists and sportsmen.

It has been found that pure crops of pine cause degradation of the soil. The most recent view from Mr. P. J. Rennie of the Research Institute of Oxford is that in forestry, like agriculture, the removal of timber upsets the chemical composition of the soil. It has been stated that the calcium, potassium and phosphorous removed by way of timber should be made good from artificial sources.(12) Insignis pine because of its yield potential is a species that will enable the grower to restore the soil fertility and at the same time give him a reasonable margin of profit.

The available information as regards the performance of insignis pine here is scanty as the plots are too small, most of them having been planted as wind-screens. The trees have not been grown in close formation and therefore, rough timber has been produced. If larger areas of fully stocked and suitably thinned plantations could be achieved the position would be different.

Planting at 6 feet × 6 feet is recommended as well as pruning of 160 stems per acre to a height of 20 feet—30 feet when diameters are 4 ins.—5 ins. Green pruning is recommeded as insignis pine was one of the few species which the late Mr. M. O'Beirne recommended to green-prune. Controlled thinning to give even ring widths of 6 rings per inch and thinning to the finest shaped boles is suggested for the production of saw-log timber and timber suitable for veneer work.

Plantations for the production of timber for industrial uses such as pulp could be planted at 9 feet by 9 feet and worked on a 20—25 year rotation. Pruning and thinning in such a rotation would not be necessary.

It is felt that the time has now come when the planter must specialize with fewer species in order to capture some of the commercial advantages which accrue from specialization and it is the writer's opinion that insignis pine should figure prominently among the species selected.

In conclusion it is well to reflect again on the example of the New Zealanders and on the courage and wisdom with which they faced the crucial decisions that always confront a young nation forging a new economy. There sawmills, wood preservative yards, drying plants, pulp and paper factories, veneer and plywood installations, all play their part in creating an economic climate of progress and prosperity for a people with confidence in their country's grand possibilities and the initiative to bring these possibilities to the goal of practical realisation.

The writer wishes to acknowledge his indebtedness to the Secretary, New Zealand House, London, for much of the information contained

in this article and also to the Forestry Division of the Department of Lands, Dublin for permission to measure some of their stands.

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(7) J. J. Deasy — *"Irish Forestry", Vol. III, No. 1, June, 1946.*

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(10) W. E. Hiley — Economics of Plantations, 1956. (Faber and Faber).

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(12) P. J. Rennie — *Quarterly Journal of Forestry, Vol. LI, No. 2, April, 1957.*

New Forestry School

The increase in the Forestry Division's activities since the end of World War II has resulted in a growing need for additional trained foresters. The accommodation available at the old school at Avondale was no longer adequate to meet this need and some two years ago the forestry training centre at Kinnitty Castle, Birr was opened. Since the publication of our last issue the formal opening of the new school at Shelton Abbey, Arklow, took place.

Forty students will be accommodated at the new School. There they will complete their second and third years of study for posts as foresters in the State forestry service having already spent their first year at the practical Training Centre at Kinnitty Castle.

It is to be hoped that the present and future students of the school just opened will live up to the best traditions of Irish forestry students of the past.

Note on Pine Weevil Control

By S. CAMPBELL

IN the replanting of felled coniferous areas, one of the main causes of the disappointment sometimes experienced is the damage caused by the Pine Weevil. On private estates in this country there have been cases of complete loss of newly planted stock in heavily infested areas and in general, where weevils occur, the already high costs of establishment associated with the replanting of old woodland, are added to considerably. These costs are occasioned by the necessity for constant and frequent inspection of the newly planted areas, as early detection of weevil infestation is of great importance, if trapping is to be effective. When an outbreak occurs continuous manual trapping has to be resorted to with varying degrees of success, often followed by considerable beating-up costs in the second year.

One of the discouraging features of weevil control is the unpredictable cost of the operation. The duration and intensity of the attacks vary from place to place and from season to season. In certain cases attacks have been known to last for a number of seasons and costly intensive trapping has been known to give disappointing results.

On the Pakenham Hall estate in Co. Westmeath, a large scale rehabilitation of old woodland was commenced in 1950. The first plantings were concentrated on areas clear-felled several years previously and little or no pine-weevil damage occurred. From 1952 onward, however, recently felled areas were replanted and pine-weevil attacks assumed greater and greater proportions as the years passed. This growing menace was not unexpected as it was anticipated that the better breeding conditions provided by a concentration of fresh stumps would result in larger weevil populations. There was a routine programme of inspection and trapping each spring and summer, and the cost of weevil control figured more and more on the costing sheets and weekly returns.

Although some trials with insecticide were carried out in 1953, the method of control relied on was that generally in use in the country. During spring and summer, strips of freshly-peeled scots pine bark were laid in shallow pits distributed throughout the threatened area. The strips, which usually enfolded a fresh spray of pine foliage, were examined daily and the trapped weevils destroyed.

The high cost of this trapping was a matter of growing concern to all those responsible for the Pakenham Hall project. The implication of weevil damage on private estates was fully appreciated by the contractors who were responsible for the replanting and general maintenance of the woods at Pakenham Hall. In 1955 it was agreed, with the Pakenham Estate Co. after consultation with Mr. T. Clear, Lecturer in Forestry at the Albert College, Dublin, that chemical control methods should be tried. As a result of information kindly supplied by the

Entomologist of the British Forestry Commission, it was decided to use the following treatment :—

Using a 25% D.D.T. solution in oil (Didimac—marketed by Plant Protection Ltd.) make up a dip containing 5% of the active ingredient i.e. one part concentrate to 4 parts water. In this mixture dip the planting stock loosely tied in bundles of 50 plants for 10 seconds to about 1" below collar. Do not immerse the fibrous roots.

During the past 2 years Didimac and D.D.T. have been used at Pakenham Hall for the control of pine weevil in the following three different ways :

A. As a preventive prior to planting as set out above.

B. In the form of spray on plantations established between 1952 and 1955.

C. The setting of Bark traps dusted with D.D.T. in areas established between 1952 and 1955.

The following are details of use and results under each of the above headings.

A. Compartment XVb—5¾ acres—which in 1955 carried a stocking of mature timber consisting of approximately 50% scots pine and 50% norway spruce, was clear-felled in the autumn and winter of that year. This area was replanted with sitka and norway spruces in the early spring of 1956 and, prior to planting, the 9,800 transplants required were dipped in Didimac solution. The cost of the Didimac was 30/6d. per gallon, and 2 gallons were required to make up the amount of dip necessary. The cost of treating 1,000 transplants (Didimac plus labour) was approximately 8/-, or 13/6d. per acre. A close watch for pine weevil activity in this compartment was maintained during spring and summer, 1956, and the following report, dated 16/5/56, appears in the Management Records.

> "Compartment XVb : There is evidence of weevil activity on the trees treated with Didimac, but only very slight damage is being caused."

Continuous observation was maintained until cessation of weevil activity in late summer. No trapping was required and very little damage was caused to the transplants. In this compartment in 1957 (the second year after planting) when it was expected that there would be a very large population of weevil present, there had been up to the time of writing (July 1957), very little damage. It would appear therefore, that the dipping of plants in Didimac solution had shown good results. It may be relevant to mention that Compartment XVb was a low-lying area with a resultant high water-table and this in itself may have contributed somewhat to a lessening of weevil activity.

Compartments XVa—6½ acres—which in 1956 carried a stocking of mature timber consisting of 50% norway spruce, 20% scots pine, 20% hardwoods and 10% european larch, was clear-felled in the

autumn and winter of that year. Sitka and norway spruces were the species used for replanting and, as in the case of Compartment XVb, the plants were dipped in Didimac solution prior to planting. At the time of writing very little damage to the transplants had been caused. The water-table in this compartment was considerably lower than that in compartment XVb.

B. Compartment XVI—11¾ acres—which in 1953 carried a stocking of mature conifers, was clear-felled in 1953 and replanted in spring, 1954. The main species used was sitka spruce. In each year subsequent to replanting, widespread weevil activity resulting in numerous plant failures occurred in this compartment. Up to 1956, the method of control used was trapping by means of bark traps. The following report dated 25/4/56, appears in the Management Records :—

> "Compartment XVI : Forester stated that there was considerable weevil activity in this compartment. Trapping operations were immediately commenced and in the course of a couple of days 1,000 weevil were destroyed."

On the 20th July, 1957, as a result of an inspection of the area, the following was reported :—

> "Pine weevil are present in this compartment in very large numbers and are attacking the young trees in a fierce fashion. The present attack, if not controlled, together with the damage caused by weevil in previous years, will result in a total failure of the trees in this compartment."

As a result of the latter report it was decided to spray each tree with a solution of Didimac—the strength of which was somewhat the same as that used for dipping. Five gallons of Didimac were required to spray the total number of plants in the area and the cost of spraying (Didimac plus labour) was approximately 17/- per acre. A very fine nozzle was used to avoid wastage of spray. The effect of spraying was immediate and appeared to have been successful in controlling weevil damage in this area.

C. During the current season it was decided that on any recently planted areas, not previously treated with Didimac, bark traps with a light dusting of D.D.T. powder on the inner side of the back strip should be distributed over any areas threatened with weevil damage. The purpose of this was to render unnecessary the need for collecting the weevils that made their way into the traps. This method of control is widely used in continental Europe. As, at time of writing, there is not sufficient data to hand on the results obtained during the season with this particular method, no definite conclusions as to its effectiveness are yet possible but results to date appear promising.

Therefore, to judge from the experiences gained at Pakenham Hall Estate it would appear that control of pine weevil, using chemicals such as Didimac and D.D.T., is quite successful and is also much less costly

than normal trapping methods and that when replanting of felled coniferous areas is carried out immediately after clear-felling, the dipping of the transplants in Didimac solution, prior to planting, is to be recommended wherever pine weevil damage is anticipated.

Tollymore Forest Park

By C. S. KILPATRICK

IN 1953 the new Forestry Act passed by the Government of Northern Ireland contained a clause granting power to the Ministry of Agriculture to set up Forest Parks and to proclaim bye-laws for their regulation.

The objects of such parks are to encourage the public to take an added interest in forestry and to offer the enjoyment of an area of great natural beauty to as many people as possible.

A forest park therefore must be an attractive forest in beautiful surroundings and either in a major tourist area or close to a large town or city.

Tollymore Park was an obvious choice as regards attractiveness and proximity to a city and being in one of the major tourist areas of the province, 30 miles south of Belfast and only 2 miles from the sea-side resort of Newcastle "where the Mountains of Mourne sweep down to the sea." It was, therefore, declared Northern Ireland's first forest park and was officially opened by the Governor, Lord Wakehurst, before several hundred guests on 2nd June, 1955.

The Park, which will be remembered by those members of the Society who visited it in May, 1952, has an area of 1,192 acres and lies in the valley of the Shimna River flowing eastward along the foothills of the Mourne Mountains in a rocky gorge before breaking out to the sea at Newcastle.

North of the river the land is undulating and similar in general topography to the farm lands outside and here are found the park lands, gardens, and fields of the estate. To the south the ground rises steeply and densely forested to the ridge known as the Drinns at 850 ft. and then falls again before rising to the main mass of the Mournes here represented by Shan Slieve and Slieve Corragh.

This area has a long and interesting history and is first recorded as having been granted by King James I to the Magennis family in 1611. Capt. William Hamilton, the father of the 1st Earl of Clanbrassil, had married Ellen Magennis and the property thus came into his possession in 1690. The 1st Earl of Clanbrassil began large scale planting and being a very keen horticulturalist and collector of rare and beautiful trees and shrubs he introduced many specimens to the pleasure

grounds beside the mansion house. An early nineteenth century source records that between 30 and 60 thousand trees were planted annually for about 15 years and a traveller writing in 1818 notes the excellent growth of larch which became locally famous.

In 1798 on the death of the 2nd Earl of Clanbrassil the estate passed into the possession of Robert Jocelyn who had been created 1st Earl of Roden in 1771 and it remained in the ownership of the Roden family until the twentieth century.

In March, 1930, the Forestry Branch of the Ministry of Agriculture acquired 808 acres, two-thirds of the estate, but excluding the mansion house, agricultural and ornamental grounds. Then in 1941 the remaining 384 acres were purchased giving the Ministry possession of the complete demesne.

Planting started in 1932, and continued as the old woodlands were cleared at the rote of 70 acres per year until the outbreak of war when it was reduced to about half of that area. The main replanting was completed in 1950 just 3 years after the first of the new plantations had been thinned. The total planted area is now 1,071 acres including 130 acres of old woodland retained largely in deference to local sentiment.

The main species used in the replanting was European Larch which had proved so successful on the medium, well drained, stony loams of the locality. Groups of oak and beech were mixed with the larch with the intention of obtaining one mature stem from each group. Douglas was used on the extensive area overgrown by laurel or rhododendron in an attempt to control these spreading shrubs by dense shade and *Tsuga* was underplanted where stands of oak were retained.

The mansion house constituted a problem as in spite of many attempts to put it to a useful purpose such as an old people's home, school, or youth hostel it remained disused and deteriorating. It was, therefore, reluctantly demolished in 1951 and the debris used as road material.

In 1953 when the decision was taken to open the park the first essential facility which had to be found was a suitable car-park in an attractive setting. The site of the old mansion house proved to be ideal and was transformed from an ugly scar to the focal point of the Forest Park.

Fortunately the forest headquarters and forester's house were on the original acquisition at some distance from the car-park and it was possible to keep the general public well away from the commercial centre of the forest.

A one-way traffic system was introduced for cars entering by the Barbican Gate on the Newcastle-Bryansford Road and leaving by the Bryansford Gate on the Hilltown Road. Cars were not permitted elsewhere as the forest roads are not sufficiently wide to allow cars and lorries to pass.

Caravan sites with a piped water supply were made by the Monument field on the side of the entrance road and a toilet and ablution building finished in wainy-edged oak and roofed with cedar shingles constructed nearby.

The open park land and old woodlands by the river allowed separate camping sites to be provided for boys' and girls' organizations, and for the Camping Club of Great Britain and Ireland without encroaching on the young plantations. Each site was provided with a source of good water either piped or from a reliable spring.

Admission charges were fixed at 1/- per car, 2/- per night or 12/- per week for a caravan and 1/- per night for each 10 campers.

The old pleasure grounds had become overgrown but a careful clearing of unwanted growth restored them to their former charm and provided the basis of an arboretum representing all the major coniferous genera and with many rare broadleaved trees and shrubs. The co-operation of several horticultural nurseries was freely given in identifying the many old varieties of rhododendron and azaleas which give such a show of colour in May and June.

Many new species have now been added to the collection of specimen trees and they have all been labelled.

A small cafe was thought to be desirable but in the first year until the park had proved itself to be an attraction difficulty was experienced in obtaining the services of a caterer and the forester and his wife took it over temporarily. Since then it has been run by a Newcastle firm of caterers and this arrangement has worked smoothly and effectively.

After the first season it was apparent that the public were loath to walk further afield than the river into the normal forest areas because they had no idea of where to go and some had a fear of being lost. This was overcome in two ways; firstly, by opening up new paths beyond the river with seats and occasional rustic shelters and sign-posting the routes to beauty points, archaelogical remains and the various bridges; and secondly, by laying out planned circular walks of 1, 2, 3 and 4 mile lengths covering all parts of the forest. Each walk was given a distinctive colour which was marked on stones, trees, or on special wooden arrows on short posts. The success of these walks has been surprising and visitors are now to be found striding along confidently, even on the longest walks, certain that they will be led back to their starting point.

The large nursery had been abandoned in 1955 as the stony soil and steep slopes would not allow it to be fully mechanised. The opportunity was taken to establish in its place some seventy $\frac{1}{4}$ acre forest plots each of which is to be planted with a different species. The plots will not all be planted at once but seed has been sown and they will be completed over the next few years.

An illustrated Forest Park Guide, priced 1/-, had been published by the Stationery Office in time for the official opening and has been

so popular that already steps are being taken to have a second edition printed.

No exact figures can be given of the number of persons visiting the park as the charge for admission is not on a *per capita* basis but some idea can be gained by the number of cars admitted.

In the first year after opening 7,095 cars visited the park and in the second year, in spite of much poorer weather, this increased to 10,794 cars and 335 buses.

It is anticipated that this number will increase further as the park becomes more widely known as already on two occasions in 1957 the car park has been unable to hold all the cars, 602 being admitted on Easter Monday and over 500 on Sunday, 26th May.

During the first season 557 caravans spent a night in the park and this rose to 818 in 1956. In the latter year 1,584 campers stayed overnight on the three sites.

A model of the park on a scale of 3 ft. to 1 mile was exhibited at the Royal Ulster Agricultural Society's show at Balmoral in May, 1957, and is to be put on permanent display in the park. The forest is represented on the model by small artificial trees and is accurate as regards species which are shown by different shades of green.

The response of the public has been beyond all expectations, not only as regards numbers but in the interest and appreciation shown and the care taken to avoid any damage to trees or structures. In fact, the amount of damage and vandalism caused by unauthorised trespassers was far greater when the public were excluded. There can be no doubt that the community as a whole will have a greater respect and love for trees and forests if encouraged to spend more of its leisure hours in such pleasant and instructive surroundings and this will in turn reap its own reward by instilling a sense of ownership and responsibility for our woodlands.

Correspondence

The Editor,
"Irish Forestry,"
Dublin.

City Saw Mills,
Mulgrave Street,
Limerick.
12th June, 1957.

Dear Sir,

We have read with interest your Winter 1956 Edition. Regarding the contribution of Mr. J. C. Kearney "Willow Growing and Utilisation in the Suir Valley," we suggest that in spite of the fact that timber boxes supplanted casks as containers, there is still a market for hoops. We were at one time very substantial users of willow hoops which are used in the manufacture of casks and barrels but the introduction of the Swedish Pyramid Butter Box and later the cardboard containers reduced the demand very considerably but we still import hoops to the value of about £300 per annum. We have various sources of supply, willow hoops from Holland, and from the Bordeaux area of France we import Chestnut Hoops. We have been using the latter for the past few years and they are most satisfactory. We see no reason, however, why Irish grown willow hoops should not be used but although we used them from time to time we ceased to do so because we found it impossible to find a reliable source of supply that could give regular deliveries of good quality hoops. We suggest that if the Carrick-on-Suir willow growers produce suitable hoops they would have no difficulty in getting sales to the extent of £2,000 or £3,000 per annum.

Referring to the report of the tour in the Black Forest, your readers may be interested to know that we imported three cargoes of softwood from the Black Forest to Limerick in 1954. The writer and Mr. Brendan McMahon visited the area in the Spring of 1954 following much the same route as your tour including Baden-Baden, Donaueschingen, Freudenstadt, Freiburg. The softwood purchased consisted of "Tanne" which is the timber from silver fir and "Ficthe" which is sawn spruce. The timber proved very suitable for general building purposes although the "Ficthe" was preferred owing to a certain amount of "brown streak" in the silver fir. A feature of the timber was the exceptional length and widths available. At one of the sawmills where mechanical pulp was manufactured, we were interested to see that there was quite a thriving industry in the manufacture of brightly printed beer mats. These were being specially manufactured for breweries all over the world including South America, Singapore, Milwaukee, and also Arthur Guinness, Son & Co., Ltd.

Yours faithfully,
Morgan McMahon & Co., Ltd.
Denis McMahon, Managing Director.

Fifteenth Annual General Meeting

The fifteenth Annual General Meeting of the Society was held in the Shelbourne Hotel, Dublin, on Saturday, 16th March, 1957, up to 80 persons being present.

The meeting was opened by the President, Mr. O. V. Mooney. The minutes of the previous Annual General Meeting, having appeared in "Irish Forestry," were taken as read and were confirmed and signed.

The Secretary then read the Council's Report for 1956.

Council's Report for 1956

The new Council met on January 9th, 1956 in Mills' Hall, Merrion Row. There were 13 members present. Mr. O. V. Mooney, the new President, welcomed the new members of the Council and spoke in praise of the work of the outgoing President. The Council passed with acclamation a vote of thanks to Mr. McEvoy for his services to the Society as President during the previous two years.

The Council made arrangements to hold its meetings at the offices of Mr. D. M. Craig and made provision for using Mr. Craig's secretarial services to a greater extent so as to relieve the Secretary of the routine work of the Society which has tended to grow with the years.

The Council appointed the following committees :—the *Editorial* to look after the affairs of the Journal, the *Finance Committee* to deal with question of expenditure, etc., the *Excursion Committee* to organise the excursion programme planned for the year.

The Council appointed a Committee to arrange for the reprinting of the Constitution in the Journal. The meeting made final arrangements for the Annual General Meeting, including speakers, venue and date. The Council then considered the possibility of a trip to Germany. A lengthy discussion followed and the meeting was adjourned to Monday, 23rd January. At the resumed meeting fresh particulars of costs of travel to, and on, the Continent were considered and it was decided to go ahead with preparations for a tour to South Germany in May. The Excursion Committee were asked to draft a circular to members inviting enrolments by 14th February. The Secretary was asked to write to the Bundesministerium für Ernährung, Landwirtschaft und Forsten asking their co-operation.

A programme of Day-Excursions was arranged and venues selected included Coollattin, Lough Eske, Emo, Kilworth, Kinnitty and Clondalkin Paper Mills.

The Council met again on Tuesday, 20th March at 85 Harcourt Street at 7.15 p.m. The Council considered the financial statement and the Council's report which were to be read at the Annual General Meeting. Arrangements were made for the reception of Mr. McNeill and Mr. Burgess.

A progress report on the German Excursion was presented by Mr. S. Campbell and included estimates supplied by travel agencies. Other matters dealt with included Editorial business, Day Excursions and election to membership.

A meeting of the Council was held on Tuesday, 25th September. Eleven members were present. A report on the Excursion to Germany was presented by Mr. S. Campbell. The Council thanked Mr. Campbell and his Committee for the success of the excursion. Particulars of gifts sent to the German officials on behalf of the participants in the Excursion were supplied. The Winter Programme was considered and reports furnished by the various committees.

The Council decided to ask Herr Oedekoven to be principal speaker at the Annual General Meeting 1957.

A final meeting of the Council held on Tuesday, December 4th, made arrangements for voting for the New Council and for the date and venue of the Annual General Meeting.

Membership.

As the Statement of Accounts reveals, paid up members on the 31st December, 1956 number 36 Grade I, 52 Grade II and 86 Associate.

Journal.

Two issues of the Journal appeared during the period under review. The standard was regarded as satisfactory. Copies have been sent, on order, to Germany, Norway, Poland, Canada, U.S.S.R., China, and several to U.S.A.

Excursions.

The programme of excursions during 1956 has been recorded in "Irish Forestry" Vol. XIII, No. 1 and 2, and members will appreciate from the reports that it was an outstanding year in the history of the Society.

Mr. D. McGlynn in proposing the adoption of the Report and Financial Statement (which latter appears elsewhere in this issue) referred to the balance in the bank of £488 11s. 0d. and suggested that the Society should find some way of using this money to better advantage. He suggested three possibilities for consideration by the Council:—

(1) That the Society should acquire land and establish a forest that would be a model for woodland owners.

(2) That in view of the extensive planting in this country of exotic species of which comparatively little is known the Society should, within the limits of its resources, finance research into the behaviour of these trees under Irish conditions.

(3) That the Society should invest in prize bonds.

The proposal for the adoption of the Council Report and Financial Statement was seconded by Mr. P. Ryan and carried unanimously.

At that stage the President referred to the sudden death a few weeks previously of Mr. F. G. Burgess, Deputy Chief Technical Officer, Forestry Section, Ministry of Agriculture, Northern Ireland, who was a valuable member of our Society and one of the principal speakers at the Annual General Meeting of 1956. Members stood in silence as a mark of respect to the memory of Mr. Burgess.

The President then read his address.

President's Address

Ladies and Gentlemen,

The Constitution of the Society lays down that at the Annual General Meeting at which he demits office the President shall deliver an address in which he shall *inter alia* review the advances in forestry and forest knowledge during the year.

I do not think, therefore, that I will be straying too far from my set course when I use *"inter alia"* and *"forest knowledge"* as my terms of reference for taking up first and foremost, what I consider to be outstandingly the most important events in Irish Forestry in the twelve months between this and our last Meeting.

I refer to the violent storms that occurred on Thursday, January 31st, 1957 and the following Monday, February 4th, 1957, which, in their effects, must have equalled or exceeded the destructive effects of the hitherto most famous big wind of 1903.

The first of these storms swept up from a southerly direction and drove through a somewhat confined strip in the N.W., mainly Mayo, Sligo and Donegal, and caused considerable damage to trees. The actually recorded velocity of the storm emphasises the event which otherwise passed almost unnoticed: 105 m.p.h. at Malin, 108 m.p.h. at Belmullet were maximum gusts recorded. This storm did not touch the midlands, E. or S. or S.W. at all.

The storm of the 4th of February which followed was on a much wider front and roared up from the S.W. across N. Kerry, Clare, Galway, Mayo, Donegal, striking also across the midlands and the east in a wider belt causing considerably more destruction than the more confined earlier gale, but adding more chaos to earlier destruction in the N.W. counties. This is the storm that must be fresh in the memory of all Dubliners.

On this occasion maximum gusts of 84 m.p.h. were recorded at Dublin. 107 m.p.h. at Malin, 100 m.p.h. at Belmullet and 80 m.p.h. at Shannon.

Strangely, to my way of thinking, these two important phenomenal storms missed their proper place in the headlines and their significance was passed over. Perhaps indeed, it is not strange that in an age of Rock 'n Roll and atomic explosions that gales of phenomenal strength should pass without a great deal of notice.

Such may be the case, but these storms should have had a profound effect on all thoughtful foresters. This sort of thing *can* really happen once in half a century—I hope not too many times more. An irresistible wind, no respecter of species, pushing over and cracking the regular coniferous forest stands and smashing down old broad-leaved belts, groups, single and roadside trees, limes, oak, beech, elm, horse chestnut, they all seemed to get much the same treatment.

Many of our members will remember the contribution by Mr. R. Lines in "Irish Forestry" Vol. X, No. 1, Summer 1953, in which he gave a very learned account of the famous gale in Scotland, 31st January, 1953. This was the gale that sank the "Princess Victoria" on the Larne to Stranraer route.

This storm was undoubtedly more devastating than ours—it blew down 40 million cubic feet of timber—due to the unusual wind directions, i.e., N.W. and N., and the length of time which it blew —up to 14 hours—and the great force—the highest wind velocities recorded were from 101 m.p.h. up to 107 m.p.h. It is not my purpose or place to-night to give a detailed lecture on these storms but it is my purpose to draw foresters' attention sharply to what has happened. Here is something—a series of events and effects which must be studied, and recorded with the greatest vigour by our foresters. There are fundamental silvicultural lessons to be learned, in fact there are great silvicultural advantages that might be gained from well considered conclusions as to the contributing reasons for the various types of damage caused. The older ones amongst us may search our minds and remember how much wind protection dominated silviculture as it was taught in our time years ago. The power of the wind was always in the old foresters' mind. Has 50 years and more without a phenomenal gale made us forget a little—perhaps not, but this new event will serve as a very sharp and serious reminder to a future generation.

We in the Society of Irish Foresters will be doing very poorly indeed if we allow Mr. Lines' excellent study of the Scottish Gale of 1953 to stand much longer as the only contribution on the particular subject, and we would be failing in our duty to the foresters of the future if we do not get something worth while on permanent record.

Reviewing routine events on the home front we see from the final figures up to March, 1956, and from reasonable assumptions on the results to be expected at the end of the present year that there has been expansion along the line in State Forestry. The total area owned by the Department in 1956 was 320,998 acres of which 269,442 acres was

productive ground. It may be expected that some 20,000 acres will be acquired at the end of 1957 which compares with 17,358 acres in 1955/56, 17,513 acres in 1954/55, 20,436 in 1953/54, and which will bring the total to date up to 340,098 acres.

The total area planted to 31st March, 1956 was 209,481 acres which, with an estimated planting programme of 17,578 acres for this year, would give a total of 227,059 acres planted at the end of March, 1957.

An interesting trend worth noting is the fact that in 1955/56 out of a total State planting programme of 14,996 acres 3,695 acres or about $\frac{1}{4}$ was planted in Mayo, Donegal, and Galway; in 1949/50 this figure was about 1/7th, and before that the proportion planted in the West was negligible. Income also has a strong improving tendency with £166,091 in 1953/54, £176,711 in 1954/55 and £220,911 in 1955/56. Of the last mentioned figure £178,594 was from round timber sales and about £29,000 from sawn timber sales. There is every reason to believe that in spite of depressed commercial conditions that the timber industry will be able to keep pace with a rising production of raw timber. One paper mill has got off to a very good start in mechanical pulping of spruce during the year, while wall board production is being well maintained as before.

In the light of Herr Oedekoven's address on North American Conifers which we will hear to-night it is interesting to examine the percentage figures of species planted in 1956. They are firstly 5% broadleaved and 95% Conifer. Of the conifers we find : norway spruce $10\frac{1}{4}$%, sitka spruce $38\frac{3}{4}$%, european larch $1\frac{1}{4}$%, japanese larch 4%, *Pinus contorta* 29%, scots pine 4%, corsican pine $2\frac{1}{2}$%, other pines $\frac{3}{4}$%, other conifers $4\frac{1}{2}$%. The total percentage here for sitka spruce and *Pinus contorta* is $67\frac{3}{4}$% and what with other conifers used, that is douglas, *Abies grandis, Tsuga heterophylla* we might say that 70% of our total plantings are Western American conifers.

In the Forestry Division report of 1935/36, which was not abnormal for those times, the species planted were sitka spruce 18%, douglas 1%, *Pinus contorta* 5% or a total of 24% for the Western North American conifers! With broadleaved trees showing 9% the remaining 67% went to other conifers with scots pine supplying 32% of the trees planted and norway spruce 17% a tremendous contrast with modern trends is shown. At that time the report stated "that scots pine, norway spruce and european larch are still regarded as the most important softwood species and are grown wherever possible."

It appears that having used N. American conifers in a pretty high proportion before 1930 we turned away from them only to return more whole heartedly to them in more recent times. We must interpret this as the forester's factual assessment of results.

Private Forestry.

There is I feel a stirring in Private Forestry which is gathering momentum in the last few years. Private owners are turning to their trees as a part of their overall business connections and many in their own wisdom or with professional advice are ploughing back a part of their realised profits in establishing well managed young forests. There is, I believe, an awakening now and, if I am right and if the trend continues Irish Forestry will stand to benefit greatly in the future from the efforts of private enterprise.

Turning to European affairs we search amongst the E.C.E. Timber Committee Reports 1956 and the F.A.O. Year Book of Forest Products Statistics, to seek their findings on the utilisation and marketing side. Production of broadleaved sawn wood in Europe has risen in recent years to 102 million cubic metres—mainly for internal use and the import of hardwoods from tropical regions has doubled since 1952 and the trend still continues.

At 8,000 million m^3 Ireland is the lowest consumer with such countries as Luxembourg 17,000 million m^3, Denmark 210,000 million m^3 and Portugal 31,000 million m^3.

Small Sized Round Timber October 1956. The principal feature was a considerable improvement in the situation compared with that anticipated and the situation of supply in relation to demand was satisfactory. The pulpwood review revealed further prospective increases in import requirements in European countries whilst estimates of export availabilities fell sharply from the 1955 level.

A marked trend away from wooden pit props is evident in some European countries, notably in France and is becoming more general. Total consumption of pitwood seems to have reached its highest in 1954/55 and a slow decline is now evident.

Europe's wood pulp production rose to 13.2 million tons in 1955 from 12.3 in 1954 and pulpwood consumption reached a new record level in 1956 at 15 million tons. The principal small roundwood exporting countries of Europe such as Finland and Sweden tend more to extend their domestic pulping and are moving towards full utilisation of their raw material supplies in their own country which must lead eventually to a curtailment of small roundwood supplies especially in pulpwood available for export.

With sawn softwood the outlook for 1956/57 is that for the first time in recent years available export supplies seem to exceed import demand said to be due mainly to deflatory precautions taken by Britain and other countries. Hitherto the difficulty was to get sufficient supplies. A corresponding gradual decline in prices consequent on smaller demands is stated to be evident all over Europe.

Europe may therefore be moving into a surplus sawn wood position.

E.C.E. Timber Committee, October 1956.

Trends in Utilisation of Wood—Its By-Products and Its Products.

While the decline in sawn wood per dwelling has been pronounced since the war there are certain signs that in the coming years it will be less precipitate. Adequate supplies and removal of controls since the war has halted this trend and even removed it in some countries. Wooden houses are unlikely to survive except locally—they depended on speed of erection, being prefabricated.

The strongest fall in wood consumption compared with pre-war has been in structural elements due to architectural changes and changed methods of construction in the form of economies in use of timber. Timber, however, still plays a dominant rôle in roofing. In the joinery field sawn wood has numerous rivals, yet, on the whole, it has stood its ground fairly well, the decline being less marked in this sector.

If in formwood and scaffolding, wood has retained its importance, the cause may be partly the slowness with which the structure of the building trends evolves in the residential constructional field. The structure is changing however and forms of wood other than sawn wood are likely to play an increasing part in the growing total demand for wood.

It is not difficult to establish that consumption of sawnwood has fallen but it is less easy to define why.

A major factor has been change in size, types of buildings and the building methods employed, wood too has often been dearer than other materials; this would tend to accelerate the trend.

Another major factor has been the more rational use of sawnwood, the straightforward economies achieved through using smaller dimensions and reducing over-generous balances.

Finally there has been widespread substitution in the narrow sense —the direct replacement of sawnwood by other materials and in certain applications the new product is technically superior to the wood product it has replaced, e.g., flush doors compared with solid doors, plastic tiles with wooden tiles, etc.

Fluctuating prices also militate aagainst timber for builders who have to make estimates.

European consumption of sawn softwood and sheet wood requirements.

Year	Sawn softwood mill. m^3	Hardboard and insulating board. million metric tons	Plywood and blockboard. mill. m^3
1938	59.2	.19	1.18
1955	49.1	1.09	2.08

The United Nations Organisation has been in the news very prominently during the year and whether or not it can survive effectively in

the political arena is a much discussed question but its forestry technical organisations such as under F.A.O. will, I presume to hope, survive, as it is my view that they are now turning out really useful work which is of great value to professional foresters and those interested in forestry all over the world.

Their publications are becoming more and more useful to the foresters in the field. I would like to draw attention in particular to the 1955 production entitled "Eucalypts for Planting" which is practically an omnibus textbook on eucalypts. Also there is the Forest Seed Directory published by F.A.O. in 1956. This Directory provides the means of seeking out seeds of most tree and many shrub species, the country of origin, and reputable seed merchants from whom the seeds can be procured. This seed directory should be of real value to the private estate owner as here small quantities of seed including eucalypts may be ordered.

Other publications worthy of mention that I have seen, and I have not seen many, are The National Forest Inventory, and Tractors for Logging (F.A.O. 1956).

Finally ladies and gentlemen, I hope I am not exceeding the proper bounds of advertisement for our own Society when I include—without any apology—our own Study Tour in Germany as one of the important events of the forest year. This tour brought 58 members of our own Society to the great and famous, classically managed forests of Baden-Würtemberg and the Black Forest. It gave opportunity to the vast majority of the members of that party who were directly associated with forestry to broaden their outlook and deepen their knowledge of the subject, and we all indeed can do with a little of that. And that is why I would like now to add my voice to a recent editorial and appeal to all of you to help the Society in a big way by getting new members. The Society offers facilities which if availed of will increase and broaden the forestry knowledge of any member, whoever he may be. There is in fact more advantage to be gained by the professional members than by the associate members among whom we have so many keen and loyal supporters.

I speak only for myself when I say that I regard membership of this Society, frequent attendances at its functions and the reading of its journal as an essential stimulant to and rejuvenator of whatever forestry knowledge and skill I may have.

Concluding, I would like to thank, most sincerely, all those members who supported our functions and outings frequently and with enthusiasm, thereby making the work of the Council worth while and satisfying.

During a very difficult year in committee I can offer my compliments and thanks to a Council and Secretary who were never afraid of work, and who were generous enough in their approach, and sufficiently

conscious of their main objectives, to solve problems and conflicting viewpoints which might have confounded councils of lesser calibre.

Following his address the President announced the results of the election of office bearers and councillors for 1957 which are given on page 2.

The private business of the meeting having been concluded there was a short interval after which the President introduced Herr Oedekoven of the Ministry of Food, Agriculture and Forests in the Federal German Republic, and asked him to deliver his address on "European Experiences with North American Conifers," the text of which appears in this issue.

Mr. H. M. FitzPatrick, Mr. T. Clear and Mr. J. J. Deasy spoke to the paper. In thanking Herr Oedekoven the President said :—

Herr Oedekoven has come a long way to deliver his address to us, and if I find myself in a difficulty to formulate effective and adequate words of thanks I would like him at least to know that he will go home having left something permanent behind him in the minds of Irish foresters and those who have been privileged to listen to him to-night. From a forester's point of view Herr Oedekoven's paper has been an exposition of deep knowledge and forest culture delivered from an unmistakeable background of authenticity, which comes from having walked in the great forests of the continents and talked with foresters throughout the world; not only that, but from having worked for years in intimate company with his own forests in Germany.

I can only thank him with deep sincerity for having brought this paper to us and for all the work that must have gone into its preparation which involved translation of ideas and technicalities from one language to another.

Herr Oedekoven's paper will appear in our Journal in due course and it will be an outstanding contribution which will be read and remembered for many years after it was spoken.

Almost every paragraph it contains is worthy of examination and invites deeper penetration and expansion of thought; indeed, as a stimulation to every possible silvicultural and utilisation consideration —some of them quite new to us—it will be of enduring value.

Obituary

Mr. F. G. Burgess

The sudden death in March of Mr. F. G. Burgess, Deputy Chief Forestry Officer of the Northern Ireland Ministry of Agriculture, came as a terrible shock to his many friends and forestry colleagues throughout the world.

After serving in the first World War Mr. Burgess took a forestry degree course at Oxford and his first appointment was with the Indian Forest Service. He served in Burma until the Japanese attack on that country in the last War, when he joined the Army and put his considerable knowledge of the Burma terrain to use throughout the campaign.

At the end of the War he joined the Forestry Division in Northern Ireland and was quickly promoted to Deputy Chief Forestry Officer. During his service in Northern Ireland the Forestry Division passed through a period of considerable change and development and at all times he proved a pillar of stability, keeping the wheels running smoothly by dint of his flair for organizing and his unselfish devotion to duty.

This Forestry Society enjoyed the benefit of his ability to organize during the study tour to forests in Northern Ireland in 1951, when he planned the timetables and made local arrangements for accommodation.

He was an enthusiastic member of the Forestry Society, and with Mrs. Burgess—who is also a member—attended a number of functions during the past few years.

Mr. Burgess took a very active part in the social life of the Bangor, Co. Down, district and a great deal of his spare time was given over to community work.

He will be remembered by his colleagues and friends as an ever cheerful personality who was always willing to go to great pains to help his fellow men.

Our deepest sympathies are extended to Mrs. Burgess and her two children.

Review

Report of the Committee on Marketing of Woodland Produce—1956

Published in London by Her Majesty's Stationery Office.

Price: 4s. 6d. net.

THIS booklet of exactly 100 pages gives in convincing detail the deliberations of a committee appointed in 1954 by the British Ministry of Agriculture and Fisheries "with the object of promoting confidence and stability and bearing in mind both the output from Forestry Commission woodlands and the need to develop markets, to consider what measures might be taken within the home timber industry to improve the arrangements for marketing produce from privately owned woodlands; and to report."

While all factors—past, present and predicted—having a bearing on the successful marketing of the future vast quantities of forest produce from the 5,000,000 acres of State and private forest land—are realistically examined within these wide terms of reference, the Report specially concerns itself with the position and prospects of private forestry in Britain or more particularly with the timber-marketing problems of the private estates, *vis-a-vis* the general timber trading structure—national and international.

That private forestry is playing an important part in the British forestry scheme can be judged from the fact (figures shown on page 12) that the area planted by private owners has risen from 9,000 acres in 1947, to 19,100 acres in 1954, while later figures to hand disclose that private planting accounted for 22,100 acres in 1954/55 and 27,200 acres in 1955/56. In fact private planting has now outstripped State planting in relation to their respective quotas of the total planting target. The State Authority, i.e. The British Forestry Commission, however, must also get considerable credit for the extent of the private acreage which was mainly due to the genuine practical encouragement given to private forestry.

Having read through this wholesome booklet one discerns that the healthy state of private forestry in England is not only due to generous State financial aid and technical guidance, but equally as a result of the optimistic confidence in future timber marketing prospects, engendered by the sympathetic concern of the State Authorities for the economic success of forestry, both private and State. Here is evidence of planning and working to a purpose so that there be "a healthy home timber trade capable of dealing with the increasing output and produce and of

adapting itself to deal with the changing nature of that output" and so that "the produce comes forward in a planned and regular flow."

Comparison is made between the State treatment given to the forester and that given to the farmer. Matters of research, processing facilities and transport costs are appraised and the idea of an import levy on imported timber is considered—to be used as a means of "ensuring that the returns received by woodland owners for the sale of their produce are not only adequate to support re-stocking and maintenance of their woodland but also in due course to provide a reasonable return on the capital represented by the woodlands." Facts and figures are presented to show accurately the past outturn and the potential yields from British forests and the proportions of home timber used against imported in the several utilisation outlets. The ten appendices (some abbreviated) substantiate the conclusions reached and in themselves make fruitful reading, representing as they do the views of such important institutions as the National Coal Board, the British Transport Commission, the Department of Scientific and Industrial Research and the Homegrown Timber Advisory Committee.

Peculiar people these British who see problems in advance and plan for the solution; who recognise the need for frequent discussions between the three inter-dependent interests in the home timber industry, i. e., timber merchant, private landowner and the State; who consider the need for a permanent central consultation body "to plan the fullest utilisation of the country's timber resources" and "to ensure the financial health and stability of the home timber industry;" and who regard all these matters as being "basic to the successful marketing of woodland produce." I suspect that we also have these forestry problems. But why worry? We always have the emigrant ship.

M.S.

British Association for the Advancement of Science, Dublin

September 4th to 11th, 1957. Sub-Section K*—Forestry.

The Forestry Sub-Section will meet under the Chairmanship of Mr. T. McEvoy, Department of Lands, Dublin. His address, on Thursday, September 5th, will be entitled "Forestry in Ireland."

On Friday, September 6th, there will be a joint session with the Botany Section on "The Ecology of Peat and Peat Afforestation" [papers by K. F. Parkin (Forestry Section, Ministry of Agriculture, Northern Ireland) and R. E. Parker (Queen's University, Belfast)].

On Monday, September 9th, there will be a Symposium on "Forest Management and Silviculture in Underdeveloped Areas." Papers will be read by Dr. F. C. Hummel ("Yield regulation and forecasts of production"); Mr. D. A. Francis ("Aerial photography and Forestry"); and Mr. T. Clear ("Assessment of Growing Stock for Forest Management").

Tuesday, September 10th, will be devoted mainly to a consideration of "Economics in Forest Management," led by Mr. W. E. Hiley, O.B.E. Mr. E. R. Huggard will read a paper on "Roads for economic timber extraction." Finally Mr. O. V. Mooney will contribute a paper on "*Pinus contorta* in Irish Forestry."

Excursions will be made to a number of interesting forests around Dublin, including Powerscourt, Shelton Abbey Forestry School and Avondale, Avoca and Glenealy, the Irish Timber Industries Ltd. and the Clondalkin Paper Mills. Also, during the Meeting, the Department of Lands will stage an Exhibition on Forestry in Ireland.

Full membership of the Association costs £3 3s. 0d. but Associate Membership at £2 2s. 0d. will entitle the members to attend the meeting. Applications should be made to The Secretary, British Association, Mansion House, Dublin, as soon as possible.

Further details can be obtained from the Forestry Section Secretary, T. H. Owen, Department of Forestry, University College of North Wales, Bangor, Caerns., or from the Local Forestry Section Secretary, T. Clear, Albert Agricultural College, Glasnevin, Dublin.

SOCIETY OF IRISH FORESTERS

Statement of Accounts for Year ended 31st December, 1956.

Income	£	s.	d.	£	s.	d.
To **Balance from last A/c.**	410	11	5			
Less amount due to Secretary	22	16	2			
				387	15	3
,, **Subscriptions received :—**						
4 1st Grade Tech. 1955	4	0	0			
36 ,, ,, ,, 1956	36	0	0			
2 2nd ,, ,, 1954	1	0	0			
10 ,, ,, ,, 1955	5	0	0			
52 ,, ,, ,, 1956	26	0	0			
3 ,, ,, ,, 1957	1	10	0			
3 Associate 1955	1	15	0			
86 ,, 1956	64	0	0			
				141	10	0
,, **Interest on Investment**				6	5	0
,, **Journals sold and advertisements**				277	4	10
,, **Prize donated by Irish Forest Products Ltd.**				15	0	0
				£827	15	1

Expenditure	£	s.	d.	£	s.	d.
By Stationery and Printing				28	7	6
,, Printing of Journal ...				206	19	8
,, Postages				29	5	9
,, Expenses re Meetings ...				39	8	10
,, Bank Charges and Cheque Book				1	5	2
,, Honorarium—Secretary				15	0	0
,, Prizes				15	0	0
,, Excursions expenses ...				22	2	9
,, Balance in Bank ...	488	11	0			
Less amount due to Secretary	18	5	7			
				470	5	5
				£827	15	1

I have examined the above Account, have compared same with vouchers and certify it to be correct, the balance to credit being £470 5s. 5d. which is on current account at the Ulster Bank Ltd. There is also a holding of £200 Dublin Corporation 5% Redeemable Stock 1968/73. Credit has not been taken for Subscriptions for 1954 £10 15s. 0d., for 1955 £27 10s. 0d. and for 1956 £64 10s. 0d., which were outstanding at 31st December, 1956.

21st January, 1957.

D. M. CRAIG, Hon. Auditor,
85, Harcourt Street, Dublin.

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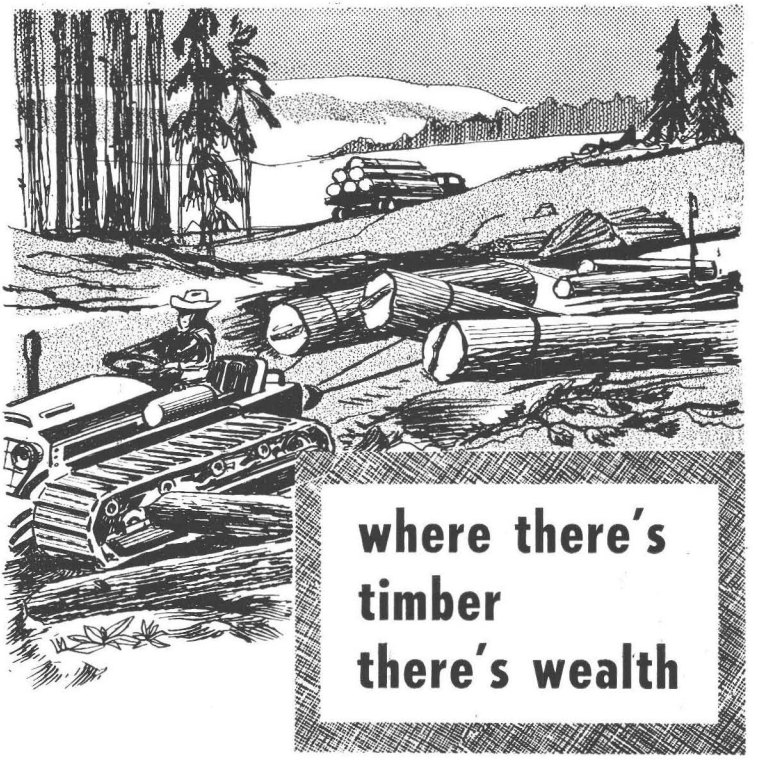

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(FORESTRY DIVISION)

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No. 39. The Quality of Poplar Plants	**6d.**	**(8d.)**
No. 40. The Pine Shoot Moth and Related Species	**9d.**	**(11d.)**
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Snowdonia National Forest Park	**5s. 0d.**	**(5s. 4d.)**
Glen Trool (Galloway) 2nd Edition	**5s. 0d.**	**(5s. 4d.)**
National Pinetum and Forest Plots at Bedgebury (Kent)	**3s. 6d.**	**(3s. 9d.)**

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A publications list will be sent on request, free and post free, by the Secretary, Forestry Commission, 25 Savile Row, London, W.1.

The Earlsfort Press Ltd., 85 Harcourt Street, Dublin.