IRISH FORESTRY

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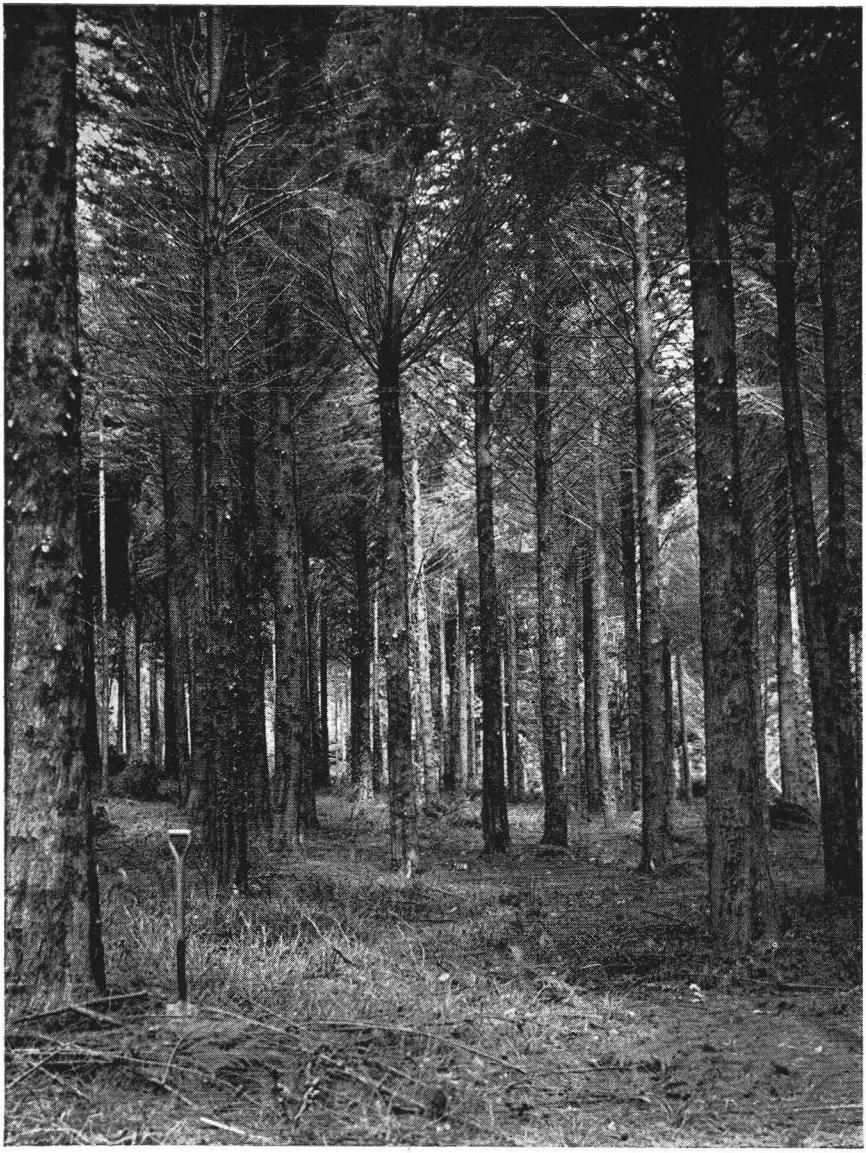

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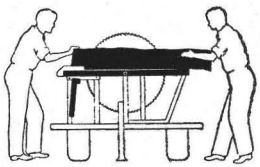

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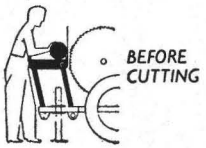

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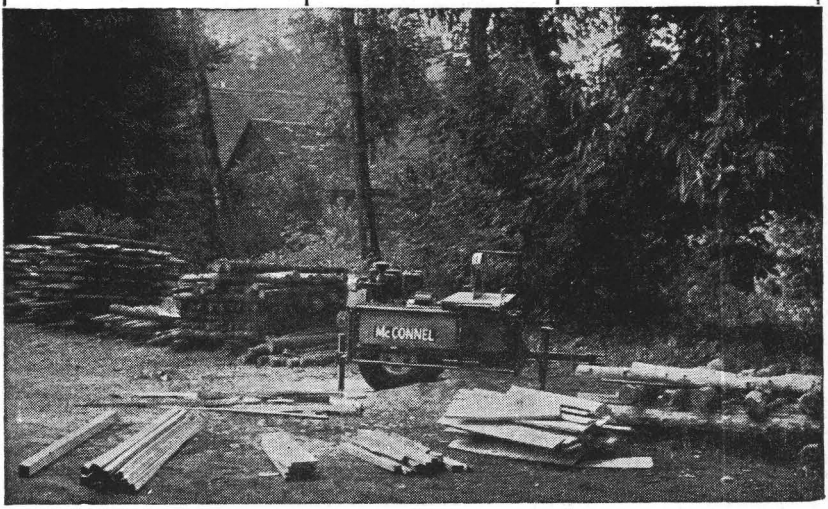

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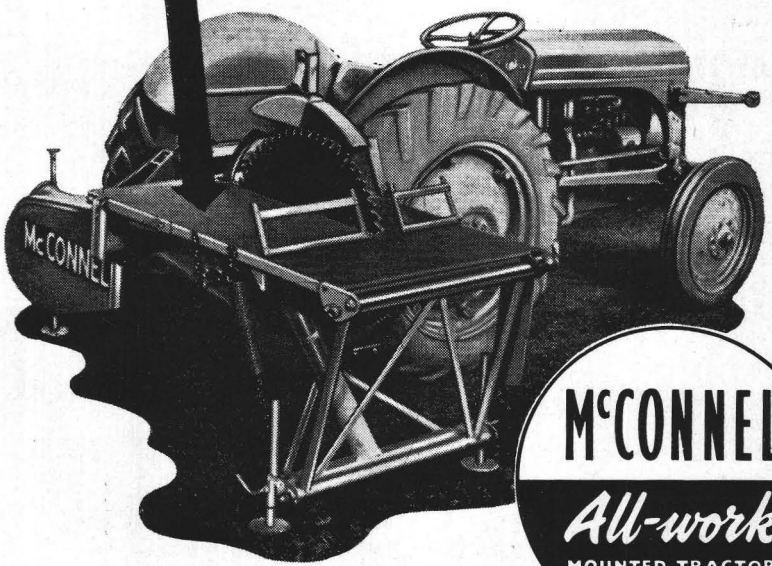

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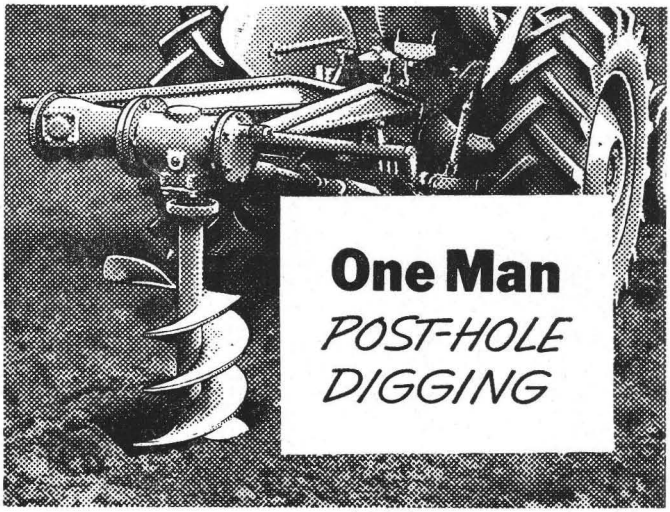

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IRISH FORESTRY

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Some Notes on the Effect of the Forest on Water Availability – A German Experiment.

By LIAM P. O'FLANAGAN

DURING a study tour of Northern Germany last May I had an opportunity of inspecting a rather unique rainfall experiment. It was concerned mainly with the effect of the forest on water conservation in a catchment area. Due to clear fellings by the occuption forces after the last war a situation developed, (normally contrary to all the dictates of German silviculturists) in which an entire valley was completely denuded of timber.

Alongside lay a forested valley of similar proportions, the crop consisting of pure Norway spruce, most of which was in a mature condition, only 3% of the ground area not being under tree canopy. The height above sea-level varied from 450 m. (1,480 ft.) at the valley bottom to 700 m. (2,300 ft.) at the highest point in the ridge separating the two valleys. The Spruce at this height was 80 ft. high × 8-11 in. B.H.Q.G. at 120 years of age. The original time envisaged was ten years but now after seven years the experiment was nearing completion due to scattered Spruce regeneration and the upsurge of the indigenous vegetation in non-forested valley which naturally would tend to invalidate the results.

This experiment was worked on a comparative basis—square metre of forest versus square metre of bare land. The forested valley was 86 ha. (212 acres) in extent, the bare one being 73 ha. (180 acres), slope and height above sea-level being essentially the same. The total rainfall in both valleys was measured by rain gauges, readings for relative humidity and maximum and minimum temperatures were also taken. The water is dispersed in the following ways :

(i) Surface water flows into streams.
(ii) Water absorbed by ground reappears in wells which eventually flow into streams.
(iii) Water is evaporated off the ground, vegetation and trees.
(iv) Water is absorbed by trees and other vegetation in the process of growth.

This dispersal is measured by the following methods :

(i) Sluices were built where the streams left the experimental area, the rate of flow being measured in two ways :

(a) By a V-shaped iron gate over which the water had to flow. The rate of flow being simply measured by the point the water level reaches in the V.

(b) By inserting a container of known volume under the water spout at the V notch and measuring by stop-watch the length of time taken to fill it.

Either of these methods gave the water flow in litres per minute.

(ii) Well water output is measured by the same V-notch system the well being built up and covered in to avoid entry of water from other sources.

(iii) The water evaporated off the forested area is accounted for by knowing the total rainfall in a given time, and subtracting from it that which reaches the ground in the same time interval. The rain which percolates through the canopy is collected in a special trough (1 sq. m.) from which number of ccs. per ha. per minute can be calculated. The amount of ground vegetation in the forested area is negligible. The run-off down the tree trunk is intercepted by a small rubber chute encircling the bole of the tree; this is transposed to the ha. basis and a time factor introduced by multiplying the run-off on an average stem in a given time by the number of stems per ha. This accounts for the percentage of rainwater which reaches the ground, the rest being held in the crown and subsequently evaporated. This was done for mature tree, pole stems, thicket and pre-thicket stages, with the following results :

36% of total rainfall held in crown by mature trees.
28% „ „ „ „ „ „ „ pole stage.
21% „ „ „ „ „ „ „ thicket stage.
11% „ „ „ „ „ „ „ pre-thicket stage.

In non-forested area ground and vegetation evaporation and vegetation water usage is calculated by subtracting stream and well output from total rainfall.

(iv) What is assimilated and transpired by the trees in the process of growth is calculated by subtracting the volume accounted for by the other measurable dispersal methods from the known total rainfall.

Very little information was got by checking water run-off on slopes. Readings from the various instruments were taken at regular intervals and graphed against their appropriate factors.

The results so far indicate the following facts :

(1) The flood point in wells occurs several days after the flood point in streams showing the length of time water takes to seep through the soil.

(2) In erosion test it was found that erosion is more severe in a given time in the non-forested valley than in the forested valley but on the whole the amount of erosion was approximately equal. The forest, however, effects the deposition of gravel, more gravel being deposited above sluice-gates (where water speed is decreased) in bare valley.

(3) The flood point appears earlier in non-forested valley and is of greater volume per minute than in forested valley where water output graph shows a much more even flow with more subdued peak periods.

(4) In March snow water does not flood to the same extent in forested valley but in April forest area output exceeds bare area output due to melting by rain of snow still in the forest. In 1953, for example, water output from July to October was higher and more sustained from bare area than from forest area. In 1958 the lines of the graph almost run together as the grass and Vaccinium growing in cleared area then used as much water as the forest in the Summer.

The overall result is that the proportion of rainfall reaching the streams is heavier in the non-forested area. Therefore the forest uses more water. To conclude, if one required as large a volume of water as possible from a catchment area the best method is to keep the ground denuded of all vegetation.

Cover Photograph

The Cover photograph shows a mixed crop of Monterey cypress (*Cupressus macrocarpa*) and European larch, planted in 1927 in Camolin forest, Co. Wexford.

The following figures were obtained from a plot measured in the summer of 1957 :

Mean height	Cypress	65	feet.
,, ,, ...	Larch	63	feet.
Mean B.H.Q.G.	Cypress	10	inches.
,, ,, ...	Larch	6	inches.
Stems per acre	Cypress	200.	
,, ,, ,, ...	Larch	60.	
Volume per acre	Cypress	3,480	H. feet O.B.
,, ,, ,, ...	Larch	470	H. feet O.B.

The photograph is printed by kind permission of the Department of Lands, Forestry Division, Dublin.

Scottish Sojourn.

By GERALD SCULLY

MY arrival at Peebles for the opening of the Royal Scottish Forestry Society's 61st Annual Study Tour in May, 1958 was something to which I had keenly looked forward for a long time. Approaching the town one is agreeably impressed by the sight of the young coniferous shelterbelts that straddle the low rolling hills so typical of South Scotland.

In Roman times Scotland was well wooded, but the forests gave way in time to agricultural development. Stock grazing and fire killed out natural regeneration, and by the 12th Century the southern half of Scotland was already well on the way towards being denuded of woods. 17th Century writers were forced to point out that hardly a tree remained in the southern part of the country, though the northern part, by contrast, had some fine isolated stands. Farmers in the south at that time claimed that trees occupied land which could be profitably cultivated, and that woods afforded shelter to the enemies of their flocks. Trees were also generally regarded as detrimental to corn production owing to their root competition and shade, so that trees were quite out of favour with agriculturists.

The authorities as far back as James I had observed this unsatisfactory state of affairs and many Acts were passed protecting woods against damage, and eventually encouraging tree planting. One of the earliest tree planting enthusiasts was Sir Duncan Campbell, who lived about 1580, but it was not until the 18th century that private planting got properly under way in Scotland, and that century might, in fact, be termed The Golden Age of Private Planting, in that country.

One of the first to plant for profit on a large scale was Lord Haddington, who established 800 acres. Another, and probably one of the greatest Scottish foresters ever, was the Duke of Atholl, who planted the first European larch at Dunkeld in 1738, and continued the good work until he had planted four million larch.

Writers of the late 18th and early 19th centuries were extravagantly optimistic regarding the profits from planting, but towards the middle of the latter century a good deal of this zeal and enthusiasm vanished before the growing industrialisation, which made heavy demands on capital for investment. Added to that was the substitution of iron for timber in ships, and building, and the growth in the import of cheap timber from overseas.

Despite this not too rosy picture, we find a few enthusiasts coming together and forming the Scottish Arboricultural Society (in the year 1854), which was to be the first forestry society in the British Isles. From its earliest years the Society displayed a commendable initiative and in 1884 we find them organising a Forestry Exhibition in conjunction with agriculture. By their persistence they eventually

influenced the Government of the day to set up a Committee, whose report resulted in the opening of a School for Foresters at Benmore. In 1909 the Society was represented on the Royal Commission on Coast Erosion, and in two years it sponsored the survey of Glenmore to ascertain the extent of its suitability for afforestation.

Forest of Ae.

The first forest visited was the Forest of Ae where Mr. J. A. B. MacDonald, conservator for South Scotland, welcomed the party and introduced the District Officer, Mr. Neustein, who lead the party while in the Forest, and Mr. J. M. Reid the Head Forester.

Considerable public attention has been focussed on this forest as being the first in Scotland to need a completely new village to house its workers. This was opened in 1947. Planting started in 1927 and by 1957 a total of 11,075 acres were planted. Previously the whole of the area was devoted to sheep farming. The forest is interspersed by 3 main valleys and rises from 400′ at the southern end, where the village is situate, to 1,750′ on the upper slopes of Queensberry which is the highest point in Dumfries-shire. The upper stretches are of peat land and the mineral soil is confined to the steeper slopes and valley bottoms. The soils are derived from glacial till with an underlying rock of shales of Silurian formation. Prior to planting the vegetation generally consisted of rough pasture grasses, *Molinia, Eriophorum* with *Culluna* and *Scirpus* on the poorer peats. The rainfall average is 55″ per annum. The current annual planting programme is 400 acres but from 1952/55 it ranged from 900 to 1,200 acres. The species distribution is 72% Spruces, 10% Larch and 18% other trees. There is a great danger of fire in spring and early summer, bulldozer lines are kept clean, but little progress has been made into breaking up this vast area of conifers into sizable blocks divided by hardwood belts. The thinning programme for '57/'58 was 771 acres giving an estimated yield of 220,000 cubic feet (hoppus) which is coming from the Spruce woods to be utilized for chipwood and pitwood. In the case of the heavier cuts which amount to 12½%, produce will be sold as milling timber. In 1953 the actual volume removed was 126,000 cubic feet of which 121,000 were pitwood leaving 5,700 cubic feet timber lengths. The estimated removal for 1959 is 260,000 cubic feet out of which 210,000 will be chipwood and 50,000 timber. The 1970 forecast cut is 500,000 cub. with the timber lengths 150,000 cubic feet. The Commissions' staff at the moment is 85 with 20 men employed by private enterprise in the utilisation of thinnings. It is expected that by 1970 there will be about 330 men employed. The new village contains 44 houses, a community hall, shop, post office, school, while T.V. is a standard furnishing in most of the houses. The community now numbers 195 as compared to 30 in pre-Commission days. There are various society organisations such as the Ae Community Association, the Women's Rural Institute as well as Men's and Boys' Clubs, while on the day of the excursion work

was proceeding on a site clearance for a secondary school. Within the boundaries of the forest are some 9 forest workers' holdings which consist of a house, garden and several acres of land held on a simple form of tenancy, one condition being that the tenant is guaranteed 150 days work in the forest annually by the Forestry Commission.

A forest lorry took us to the first stop which was at Research Sample Plot No. S.152, Norway spruce planted in 1928. When last measured in 1955 the total height was 57'; basal area per acre after thinning was 143.6 sq. ft. and the standing volume in hop. feet O.B. was 3,350. The plot was first thinned at 20 years and subsequently received four thinnings giving a volume removed of 1,350 cubic feet. The method of thinning was a light crown thinning leaving 200 dominants with lighter small trees performing natural pruning functions. Mr. MacDonald pointed out the disadvantages of such a large number as 200 trees per acre as it is not feasible to develop an uneven canopy with so many dominants.

At Stop No. 2 Mr. MacDonald stated that he was convinced from his research experience that a heavy crown thinning was best in these circumstances as it made conversion to irregular canopy woods more simple. In this plot of 22 year old Norway spruce Crown Thinning in various stages of marking was demonstrated by Mr. Neustein to illustrate the phases in the marking of a crown thinning.

Plot I. Approximately 80-100 well spaced dominants per acre were selected i.e. averaging 7-11 yards apart (good care being taken that trees on drain edges or any other factor which would take from the stability were considered).

Plot II. Dominant trees competing with crop trees were marked for removal.

Plot III. In this Plot:—

(a) The dominants marked in Plot II as competing with crop trees had been removed

(b) Trees competing with "Pruners" were marked for removal (Pruners being smaller trees round the final crop tree which by their shade killed off the latter's low side branches).

Plot IV. The trees marked to relieve the pruners had been removed and any light groups not affected by the marking up to this stage are thinned in the normal way.

The next stop was in C.115 where we saw Norway spruce planted in 1939. A thinning competition was arranged here. In this compartment three plots were marked out; Plot 1 contained two final large

trees. All the trees were numbered, the object of the test being to select the correct dominants.

Plot 2. In this plot the two final crop trees were pointed out and the test was to select the competing dominants for removal.

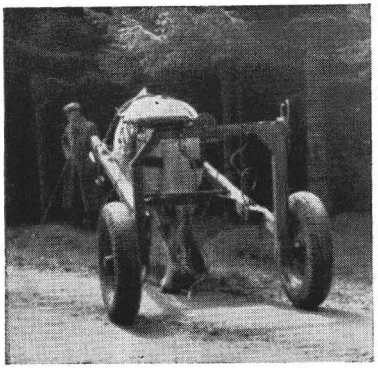
Plot 3. Here two final crop trees as well as their competing dominants were pointed out and the test was to indicate the trees which were competing with the "pruners".

It might be well at this stage to give some of the reasons for the introduction of this type of Crown Thinning which could be associated with Professor Heiberg's Danish Crown Thinning. Crown thinning as locally practised has been in operation for 4 years and the following advantages are claimed :

1. The best trees can be given room for rapid symmetrical crown development by removing only a small number of large trees. By traditional methods this can only be achieved by a very heavy low thinning.
2. An uneven canopy is obtained which may result in a more windfirm crop in a clean forest floor and a finely branched high quality final crop trees.
3. It is ideal for treating mixtures of varying shade tolerance.
4. It is more economic as in the first thinning larger trees are removed.
5. Increment potential of the whole crop is concentrated on the best stems from an early stage, thus producing a greater yield of high quality timber.
6. An uneven crop lends itself to later group felling and regeneration without the risk of windthrow, which may be preferable to clear felling large areas and the resultant loss of forest conditions.

The next stop was in C. 131, a 28 year old stand of Norway spruce where felling, hand and horse extraction, work study costings and conversion of poles to chipwood lengths were in progress. It was noted that the horse held his own in the hauls up to 130 yards. The felling of spruce of poles up to 7½" Q.G. was done by one man as work study research revealed that this resulted in maximum output. Most of the conversion work was done by one man with a bow saw which had a hard toothed blade. This blade was not sharpened as the time spent in doing so was equal to the cost of a new one. The "life expectancy", in statistical parlance, ranged from 3-5 weeks. The ideal axe has been found to be a 4 ib. one with a 27" to 30" handle. Peeling is done by

a Scandanavian-designed peeler with a detachable blade. A measuring stick with a scribe in the end is used before snagging to measure the desired log lengths so that only the usable portion of the log is snagged. Extraction between the lines is done by horse and rubber-tyred dray as illustrated in the photograph. When the poles are hauled to the roadside they are slipped on to a $4\frac{1}{2}'$ long flat topped, tubular steel, triangle-shaped horse which is most convenient for subsequent handling. Poles are then cut to the required lengths at the roadside by a rubber-tyred portable mill which is doing a cheap and satisfactory job. Power saws in the wood were found uneconomic as only 40% of the operator's time was productive.



Forest of Ae. Horse extraction.

Illustrating the crown thinning in *Sitka spruce* stand in Forest of Ae.

The next and last stop was at a Research Sample plot where Mr. MacDonald pointed out the shade bearing qualities of the Sitka spruce and demonstrated that crown thinning is practical with this species as illustrated by photograph. Mr. Gribson thought that the danger of

windthrow without some system such as crown thinning would be considerable especially when trees got up into the wind zone. He also stated that there was evidence of considerable peat shrinkage in the forest where spruce was growing and that there was a danger that this shallow rooter would remain on the peat layer and not enter the compacted sub-soil, thus giving rise to the danger of large scale windthrow.

The excursionists were entertained to tea in the village of Ae where Dr. Gorrie thanked the conservator and his staff for such a highly informative tour.

That night there was a discussion on the Scottish Woodland Owners' Association in the Picture Gallery of the Chambers Institute in Peebles. Mr. J. Maxwell MacDonald of Largie delivered the opening paper and a lively discussion followed.

There was much emphasis on the desirability of a Marketing Board of the same type as that which serves agriculture, but nothing definite on this point emerged. It was pointed out forcibly that the production of quality timber did not pay the grower as he got nothing extra from it and a case was made for a system of sampling and grading. Without some common denominator or measure of timber values it was stated that private estates would not be able to judge the value of their produce. It is expected that a definite timber marketing policy will emerge in the near future in Scotland. It was also mentioned that the price of pitwood was depressed as the Coal Board were trying to recoup some of their five million pound losses; and timber growers generally were having anxious times especially those with light thinnings ready for the market.

Dawyck Estate.

The visit to the Dawyck Estate attracted a large crowd and this beautiful demesne of cultivated fields and woods of some 1,000 acres was seen on a perfect summer's day. The well laid out walks bordered by daffodils in bloom with a background of Azaleas and Rhododendrons and many oriental shrubs and herbacious plants made what one might term a riot of colour. The woods on the outer periphery of the estate framed the picture!

The party was welcomed by the proprietor, Colonel A. Balfour, who traced the history of the planting in Dawyck since the days of its ownership by the Veitches who were an old border family. Fortunately for forestry, the Veitches as well as the Balfours who came after them were devoted to silviculture and the woods at Dawyck have been famed for their beauty since 1650. Continuity of management of woodlands is essential, and it is fortunate that this well-wooded estate has been managed with care for 300 years. The woods are planted within the elevation range of 600′ to 1,500′ with an average annual rainfall of 35″ and severe frost is experienced in winter. The soil is mostly light loam, with good natural drainage. This is a most interesting woodland as many new species introduced to Scotland were grown from seed at

Dawyck and it was particularly pleasing to have an opportunity of visiting this magnificent and historic estate. It is noted that the largest Douglas fir measures 142 ft. in height with a Q.G.B.H. of 49" giving a total volume of over 700 cubic feet, while the larger Sitka spruce measures 117 ft. with a Q.G.B.H. of 50¾" and a volume of 500 cubic feet. There are about 1,000 acres of woods enclosed with 750 acres dedicated. During the last 40 years the species mostly planted were Sitka spruce, Douglas fir and Japanese larch. Experience with European larch is that it suffers from canker and die-back while the performance of hybrid larch is most encouraging and it is a very popular choice at the moment. This species thrives on the dry hillocks and is fairly frost resistant there. As most of the plantable land is already fully stocked, and it has been found uneconomic to plant above the 1,200 ft. contour line, the major operations are thinning and felling of small patches of mature trees, so that the planting programme is about 10 acres a year. Group fellings are pursued as opposed to clear fellings and every effort is made to encourage natural regeneration while the general policy is the establishment of uneven-aged woods.

The first wood visited was Bellspool which is divided into two sections one stocked with hardwoods and the other with softwoods. Group regeneration is being pursued on both areas. In 1953 the filling up of groups and planting of hybrid larch, Norway spruce with further extensions since then to the groups of *Tsuga heterophylla* and some hardwoods. There was a lively discussion on the size of the groups, natural versus artificial regeneration and clear felling as opposed to group methods. The next stop was a plot of Scots pine/Douglas fir with a mixture of hardwoods. Here replanting on clear felled groups with *Tsuga* and Norway spruce has been carried out. In February 1957 a plague of field mice attacked the *Tsuga* destroying 50% of the trees in some groups. It was rather strange that *Tsuga* was singled out for the attack.

The next wood visited was an unusual mixture of Douglas fir, Norway spruce and Sitka spruce. There was general agreement that the thinnings here in early years were too light as the B.H.Q.G. for a crop 50 years old was not satisfactory. The timber trade group pressed for complete felling and a stem with butt rot obligingly justified one of their advocate's claims. It was unusual to see Douglas fir and Sitka spruce growing so satisfactorily in association and strangely enough the volume advantage was with Sitka spruce. A view of one of the more senior members was that Douglas fir was not at home on this type of site as it contained too much moisture, and Sitka spruce was suggested as a more suitable alternative.

The Policies in the glen were next visited and some 50 year old *Chamaecyparis lawsoniana* was inspected from which it was evident that this species grows very slowly with a tendency towards forking. Some 30 year old *Tsuga heterophylla* and Sitka spruce in mixture were noticed as well as some fine specimens of Sitka spruce planted in 1856,

and Douglas fir planted in 1835. The hill behind the house was then climbed and plots of *Picea rubra, Picea asperata, Picea orientalis* and *Pinus monticola* planted under forest conditions were visited. *Pinus monticola* was affected by rust as usual, but the shape and form of the trees were excellent. Here a competition on volume estimation of growing timber was held with Mr. D. Ramsay winning the prize. On the way to Dawyck House some of the oldest specimen trees, many of which were grown from seed when first introduced into Scotland were inspected. The oldest tree was an *Abies alba* planted in 1680, next was a European larch planted 1735 followed by *Abies nobilis* planted in 1831, while at the end of the walk was a mere youngster of *Tsuga heterophylla* introduced in 1860. The latter is a tree of exceptionally good form with light branching and regenerating freely. An exhibition of forestry machinery was later held in which some of the leading firms in the U.K. and Sweden demonstrated.

On the way back to Peebles Mr. Dalgleish pointed out a larch site on which he had seen three crops of timber grow. In 1916 while apprenticed to a local merchant he saw the first crop felled. The site was replanted and another crop was harvested in 1942 while to-day still another crop is growing vigorously on the same site.

Glentress Forest.

The visit to Glentress where the Department of Forestry of Edinburgh University are carrying out experiments under the direction of Professor Anderson and Doctor Taylor his assistant fully justified our expectations.

Dr. Taylor pointed out that for 6 years this forest has been under the management of the University, the local Forestry Commission's staff performing the actual operations. The forest is situated quite close to the town of Peebles and lies on the upper slopes of two spurs with an elevation range of 800′ to 1,830′, most of the plantation lying above 1,250′. The rainfall average for the area is 37½″ with 206 rainy days and the incidence of ground frost is estimated at 100 nights annually. The average relative humidity is 77.5% and mean annual temperature is 45° F. There is exposure in the southern and western aspects. Soil is mostly of brown earth slightly leached on the higher ground while on the lower slopes there is a heavy glacial till. Before planting which was started by the Forestry Commission in 1920 the vegetation was pasture grasses and mosses. Dr. Taylor stated that the present objects of management were to create and maintain in perpetuity a forest of irregular structure with treatment based on the accumulated experience with a view to the ultimate establishment of a maincrop of climax species of irregular structure and composition, especially Norway spruce, silver fir and beech. The main crop species will be introduced by groups retaining existing species as pioneers, while the margins on the exposed high ground are to be thickened with relatively slow growing trees such as sessile oak, ash and sycamore. Dr. Taylor pointed out that the area

was divided into six blocks of equal size which are treated in turn one each year. The block of the year is enumerated, fellings marked and groups selected for planting the following year. The conversion period is fixed as 60 years so that 1/10 of an annual block will be planted each year. It was stressed by the Director of Studies that groups are sited with the long axis north to south with light demanders in the northern half and shade bearers in the southern half. It was noted that some of the broad leaved species were not doing well and the vigorous thick mat of grass could be attributed to their poor height growth, as competition for available moisture must be considerable during times of dry weather. It was suggested by some of the members that the hardwood groups should only be introduced into stands which had already closed canopy and that the opening up should be just sufficient to minimise the grass competition at least during the early years of the young trees. Various views were put forward about the future of silver fir and its susceptibility to Chermes but Dr. Taylor maintained that a great deal of the trouble with that species arose from the fact that trees were planted on marginal and unsuitable sites and that the problem was one of selection of species to avoid planting on unsuitable sites. Discussion also centred on planting Sitka spruce on dry sites and a case was made for having humidity tests for the upper and fog bound summit as well as on the lower slopes. Dr. Taylor went on to explain that the Glentress experiments were closely associated with similar ones of the Swiss/French/German/Danish pattern where the Check system of management was in operation. He claimed that climatically in many respects Glentress conditions resemble those of some of the forests in western Europe where the Check method of management has been practised for over 50 years. Dr. Taylor pointed out on plots already measured that the system of measurement is 100% calipering by compartments and blocks of all stems over 3¾" B.H.Q.G. The trees are arranged in a stand-table by 1½" Q.G. Groups, ranging upwards from mid group of 4½", 6", 7½", 9" up to 21". Standing volumes are calculated by means of a Conventional Volume Table in hopsils. When fellings take place they are measured on the ground according to B.H.Q.G. classes, timber height and Q.G. at half timber height, thereby obtaining actual volumes. Such volumes for each species are related to the management volumes (hopsils) and a conversion factor calculated. It is hoped that the conversion factor for a particular species with approach unity as improvements take place in growing stock. The selection of a Q.G. as low as 3¾" affords detailed managerial information on the development of the smaller stems. It was pointed out that the Check method recommends itself for the management of uneven aged stands, because it records the development of the stand by compartments with a high degree of accuracy and is highly adaptable to any abnormalities which may develop. It has also the advantage of uniformity in recording, experiments with the composition and density of the stand over a long period of time are possible.

In Glentress, stem/number curves are prepared for each compartment and production calculated whenever the necessary information is available. No prescribed cut will be fixed until adequate increment data are available. This aims at the development of irregular stands of good health. Discussion centred on the close planting of the trees in the groups. One of the private planters advocated the Hiley approach and drew attention to the high establishment costs per acre of 3′ planting and the difficulty of finding adequate capital to finance planting projects. It was pointed out that in large scale planting the health of the growing stock, and therefore the quality of the timber produced, was of the utmost importance, as a high volume per acre of trees suffering from butt-rot made poor comparison with a lower volume of healthy stems. Confidence in the Anderson silvicultural gospel was affirmed as tree farming and silviculture are diametrically opposed.

The advantages of growing trees in close formation when young was stressed as diameters of narrow annual rings are produced giving a higher proportion of summer wood to spring wood. It was also learned that Dr. Anderson is of the opinion that summer wood ought to be more resistant to fungal and bacterial attacks as it has long narrow cells and a higher proportion of resin, aromatic oils and other chemical substances than the spring wood, hence the need for dense stocking.

Major Paterson expressed the party's appreciation of Dr. Taylor's stimulating leadership of this tour and said that all present would follow the fortunes of the silvicultural experiments with lively interest. Personally I was highly pleased to have seen Glentress and was fascinated with the grace, ease and modesty with which Dr. Taylor replied to the continuous barrage of questions from the party. The Forestry Commission are to be congratulated on their wisdom and generosity in allocating this splendid forest to silvicultural research.

Cardrona Forest.

The next forest visited was Cardrona where some European larch plantations were inspected. Here crown thinning was also employed with the usual number of 80-100 final crop trees isolated from the others. A long stimulating discussion took place and Mr. Whayman, who has had considerable experience in the growing of larch and Scots pine thought the stand over-stocked and the crowns rather short. In fact with considerable reserve I would say that Crown Thinning is not altogether suitable to light demanders particularly larch.

The party then moved back to another property of Glentress Forest where we saw a mature 90 year old stand of European larch in which there is some evidence of the presence of *Fomes annosus*. Back in 1942 some of the stand was underplanted with *Abies grandis* while since 1950 Norway spruce has been introduced as well as some beech. The planting of Norway spruce which is so susceptible to *Fomes annosus* was not considered to be a good choice and there was agreement in the suggestion for its removal for Christmas trees and its replacement by Douglas fir and silver firs.

Dalkeith Woods.

The study tour terminated with a visit to Dalkeith Woods which are owned by the Duke of Buccleuch.

The Head Forester, Mr. W. Mowet, led the party through the estate. He explained that the woods have been under regular and somewhat intensive management for 50 years. The aim is to keep the woods fully stocked and in recent years selection felling and underplanting has been practised as much as possible. Broad-leaved trees have been used mainly with conifer nurses especially larch. The woods lie between the elevation range of 500′-700′ and are fairly scattered and irregular in outline. One portion of the wood has been allowed to

At Dalkeith Woods.
Some beautiful boles of Ash, Beech and Sycamore.

remain in its natural state to accord with the wish of the Nature Conservancy and this course has also received the approval of the Forestry Commission.

After inspecting the Estate's small efficiently kept nursery, which supplies transplants for the home estate as well as for the Roxburgh and Selkirk estates, the party moved on to the various small plantations within Dalkeith Woods.

The first stop was at a plot planted in 1938 with oak groups, the balance being European larch with a small percentage of beech. After four thinnings the larch has been practically removed leaving some nice quality hardwoods. At the next stop it was noticed that a 45 year old crop of sycamore and beech was doing satisfactorily while in the plantation immediately after this we saw a 28 year old mixture planted originally in alternating lines of European larch, beech, Spanish chestnut and ash. Some really fine hardwood poles particularly ash were admired in the well-thinned stand shown in the photograph. (p. 16).

It was noticed in the Dalkeith estate that where soil and sites were unsuitable for agriculture because of marginal fertility on the one hand or of too steep a gradient on the other, the ground was used for planting with the dual purpose of providing shelter for stock and dairy cows as well as producing timber. Without the benefits of shelter afforded by the plantation the higher ground of this area might be marginal for stock rearing whereas at the moment it is supporting milch cows. This estate was high lighted by the costings section under the Chairmanship of Professor Zuckerman, as being a model of forestry and agricultural integration.

The last stop was at a beech/sycamore/oak plantation, where the Head Forester pointed out that the nearby housing estate together with the mines proved a lucrative outlet for light thinnings. This concluded the Study Tour.

General.

In the Edinburgh district Dr. Caborn collected much of his material for his thesis entitled "Shelter Belts and Microclimate." I was fortunate, during the Study Tour, in making the acquaintance of Mr. Edwards, silviculturist to the Forestry Commission Research Branch, on whom I called by arrangement at his home in Edinburgh. After showing me the relevant maps of the district, Mr. Edwards very kindly offered to conduct me over the locality where his research had been carried out. I am glad of this opportunity to express once again my gratitude to Mr. Edwards for his great helpfulness to me on this occasion.

The district which we visited is at the foot of the Pentland Hills, a range running from S.W. to N.E., with many shelter belts on its slopes. One of the belts visited was situated in Dreghorn, and has a width of 21 yards comprising mainly Scots pine, with a small proportion of sycamore, oak, elm, ash, rowan, birch and beech. The belt runs from north to south. The local topography causes wind deflection so that the prevailing wind is westerly, as demonstrated by the tree growth. To the windward side of the belt there is a whitethorn hedge, which is part of the belt, with a top height of some 10 ft. Moving lee-

wards there is a gradual increase of height growth until, on the opposite or leeward side of the belt the height is about 40 ft. The Scots pine runs through the centre of the belt and is flanked on either side by hardwoods. On the leeward side the land has been recently cultivated and reseeded, and it carried a dense stocking of grasses and clovers. Sheep were grazing placidly here, even though it was raining heavily and there was a high wind. This area is part of a progressive pattern of farming in South Scotland, and might be regarded as a model in agricultural management. The fences and ditches have been levelled and drained, and the space which they formerly occupied has been devoted to the planting of shelter belts at fairly frequent intervals.

From Dr. Caborn's findings it is clear that the benefit of shelter to pasture and animals is considerable, but I venture to suggest we must await his more conclusive findings before determining the orientation, silviculture and quality of shelter necessary for the establishment of an economic forestry partnership.

Scotland's foresters are well to the fore with the introduction of new ideas, as well as with experimentation in the adaption to home conditions of systems that have been tried out satisfactorily elsewhere. One such scheme is the school for private forestry workers, where young men take part in a six-weeks' training course on the many aspects of forest work. Tuition by demonstration lectures ranges from the correct method of seed sowing to loading timber for the mill yards. Simple costings are taught, and elementary botany also finds a place in the curriculum. The Forestry Commission is to be congratulated on this imaginative step towards the provision of a nucleus of highly efficient private forest labour similar to that found at Zwingenberg.

Another item discussed with the Scottish Foresters was the difficulty being experienced by the Forestry Commission in maintaining its intake of land to meet new planting requirements. A variety of reasons are apparently responsible for the fall-off in land acquisition, the major causes being the legal difficulties in acquiring land free of encumbrances, for example, commonages, competition for the land with agricultural and other interests, the low price payable for forest land and hostility to the Forestry Commission. As regards the last mentioned, it was felt that in the early years lack of experience resulted in the acquisition of land without adequate account being always taken of the farmers' point of view. These grievances have since been remedied, however, and the goodwill of land owners near the plantations is now properly regarded as vital to the success of afforestation.

The Commission are reluctant to increase the price of land as it would affect agricultural land values generally. Economists do not encourage forestry on to the better quality uplands, as they argue that if the $3\frac{1}{4}$ million acres of reasonably good quality uplands in the U.K. were improved so that 39 instead of 25 mature bullocks could be supplied per 100 acres, the national output in stores would be increased by 0.4 million, and with the fattening of these cattle in the lowland

yards, the 120,000 tons of beef, or one-third of the 1955 beef imports would be produced. It would appear that forestry in Scotland will be confined to the areas of marginal quality as far as agriculture is concerned.

There is, however, a fairly large block of unproductive forest land in the cut over woodlands; still left from World War II.

I was fortunate, before leaving for Scotland, in having obtained statistics of conversion of woodlands to agriculture, costed and prepared under the London School of Economics. This directed attention to the fact that almost 0.4 million acres of derelict woodland were unproductive. Some Scottish foresters, especially those in private planting, were glad that attention was focussed in this way on the fact that such a large acreage of land, capable of producing the finest tree crops, was lying idle. The private owners also claimed that during the War, when they had hoped to reap the benefit of greater profit after years of depressed timber prices, the Government stepped in with price controls on timber on the grounds of its importance as a commodity. This, they believe, is responsible for the fact that, to-day, due to death duties and lack of capital, this large acreage of the best timber producing potential is lying idle.

Private planters can lay claim to a major contribution in Scottish forestry, with the 1949 census showing as much as 1.1 million acres of woods in their hands.

Another item of interest revealed by the same census is that of the total stocking of both private estates and Forestry Commission plantations, 46% is of Scots pine, while the total of the high yielding species, such as Douglas fir and the spruces amounts to some 37%.

The Scottish Tour was most successful, and, apart from the forestry experience gained, I enjoyed my stay immensely. The kindness and generosity of the Scottish people is something that has to be experienced to be properly appreciated.

In conclusion, I would like to join in the tribute paid by the members of the Society to their able and energetic Secretary, Mr. Gallaway, and his Assistant, Mrs. Page.

The briefings which we received on the forests to be visited were, in particular, most helpful and imaginative and added greatly to the interest and enjoyment of a memorable scientific experience.

CORRECTION

Irish Forestry XV, 1958, page 42.

The sentence beginning on the line 36 should read :

Germany, however, was not troubled with the wholesale trade of state-property owing to the theory of free-trade as established by Adam Smith. In Austria, on the contrary, two and a half million acres of woodland was sold to private owners.

Report on Mechanical Preparation of Derelict Woodland for Planting.

University of Dublin—Kells Ingram Farm.

By Dr. N. Murray

AS woodlands manager for Kells Ingram Farm, Drogheda, Co. Louth, I was faced in March 1958 with the preparation for planting of 14 acres of derelict woodland. Apart from the high cost of the method, hand clearance could not be considered at this late stage and I was accordingly authorised by the Management Committee to hire machinery for preparing the land.

The area was heavily covered with lop and top and briars. There had been an average of 57 commercial trees per acre but the actual number of stumps was much greater due to scrub and inferior trees.

The contractors were not required to remove any of these stumps but only to push all lop and top and briars etc. into heaps for burning by estate labour. The machine employed for this purpose was a D4 bulldozer hired at the rate of 45/- per hour. Work commenced on 14/3/58 and ended on 9/4/58 during which time the machine put in 89 working hours at a total cost of £195 4s. 0d. (average £14 per acre). Bad weather caused delays. The soil in the area is heavy and impervious and was readily "puddled" by the churning action of the 'dozer tracks on the wet surface. Progress was slowed up by these soil conditions and it was practically impossible for the operator to prevent large quantities of mud from being pushed into the heaps. This mud rendered burning very difficult and in some cases nearly impossible.

A worry which the ensuing summer did not justify was that the ground scraped clear of vegetation at this late stage would dry and crack under sun and wind resulting in loss of plants due to drought. This operation on sloping ground could, under wet conditions result in loss of soil by erosion.

On a few occasions the 'dozer got jammed on hidden stumps but the operator was able to work it clear.

An average of 10 to 12 heaps per acre were made and these were left for a few days to dry before burning was attempted. Old sacks cut up and soaked in T.V.O. were found convenient for firing the heaps though a pressure flame gun was found to be better and quicker provided sufficient labour was available to tend a large number of fires started in quick succession. Old engine oil and rubber tyres are also suitable for getting fires going. If the fires can be started while the 'dozer is still operating in the vicinity the fires may be conveniently tidied in by the machine as they must be tended or else will burn out in the centre leaving a large outer ring of unburned material.

Where there was scrub or sapling growth it was found necessary to have this felled in advance of the 'dozer as otherwise it was only pushed over and sprang erect again when the machine passed. If the 'dozer blade was lowered in order to push such material out of the ground it was found to cause too much disturbance of the soil and hold up progress to an undesirable extent. While a larger and more powerful bulldozer might be capable of pushing heavy material into heaps more easily, its greater width would render it less manoeuverable between stumps resulting in less efficient cleaning of the ground.

In corners, on ditch edges, etc., briars may be conveniently removed by driving the dozer in with the blade raised, lowering it, applying pressure and reversing away dragging the briars out of the ground ("backblading"). When dealt with by bulldozer this troublesome growth remains in check longer than if it is merely chopped off at ground level leaving the roots undisturbed to sprout again.

Hand clearance of the area in question would have cost £20-£25 per acre.

Costs:

Bulldozer clearance of 14 acres 89 hours at £2 5s. 0d. per hour	£195	4s.	0d.
Assisting bulldozer driver when in difficulties 7 man hours at 2/- per hour		14s.	0d.
Cutting light scrub in advance of bulldozer 68 man hours at 2/- per hour	£6	16s.	0d.
Labour for burning material pushed into heaps 192 man hours at 2/- per hour	£19	4s.	0d.
Oil for burning heaps, approx. 66 gallons at 1/6½d. per gallon	£5	1s.	9d.
Total	£226	19s.	9d.

Average cost per acre in thus approximately £16.

Drainage work was carried out in the wake of the bulldozing operation. A 10 RB dragline excavator was hired at 25/- per hour commencing operations on 26/3/58 and finishing on 16/4/58. 396 yards of new drains were excavated and 1,136 yards of old drains were re-opened (total 1,530 yards) in 107½ hours at a total cost of £133 8s. 9d. (1/9d. per yard or £6 per acre approximately).

Needle Fusion in *Pinus contorta* in Ireland.

By N. O'Carroll

THE disorder known as fused needle disease of Pines has been known in the South of England for more than twenty years (Jones, 1938) in California, in South Africa and Australia and New Zealand (Young 1940) where it has received a great deal of attention. Apart from a general unhealthy appearance and lack of vigour the disease manifests itself most obviously in the failure of the needles to elongate, or even at times to emerge from the sheath. They are not actually "fused" in the usual sense, and can be separated easily by the fingers.

The condition was first identified in Ireland in Bansha State Forest, Co. Tipperary, by Mr. R. Lines of the British Forestry Commission in the course of a tour of Irish stands of *Pinus contorta* in October 1958, and has since been found in the same species in Ballyhoura forest, Co. Cork. In both these areas the affected stands are growing on an infertile podsol, with ironpan, of old red sandstone origin. Both were planted (Ballyhoura in 1926 and Bansha in 1935) without ground preparation and without manures, a practice no longer current in such areas. Only a small proportion of the trees in these areas is affected although the crops in which such trees occur are far from satisfactory. In Bansha the needle fusion symptom is accompanied by a dying back of the upper leading shoots which seems to have occurred quite suddenly between two growing seasons without any remarkable falling off in height growth in the last years.

Perhaps the most thorough investigation of the disorder has been made by Young (1940). Working in Queensland, Australia, with *Pinus taeda* and *P. caribaea* he obtained a marked improvement in affected crops by the application of phosphatic fertilizers, by direct and continuous feeding with carbohydrates via cut roots, and by the application of litter. In a series of pot experiments diseased seedlings recovered when planted in cowdung or in a mixture of soil and cowdung but reverted to the diseased condition at the end of the first or second growing season. He concluded that the action of the phosphates was mainly indirect, in stimulating the development of mycorrhizas which, in addition to making nitrogen compounds and mineral salts more readily available to the tree, also supplied an essential part of the tree's carbohydrate requirement, obtained from fresh organic matter in the soil. He thought that the direct nutrative action of the phosphates was slight.

An unexplained response to the application of boron to diseased *Pinus muricata* was obtained by Ludbrook (1939). Similar applications to *P. ponderosa* and *P. radiata* gave negative results.

More recent observations by Jones (1952) suggest that the disorder is caused by a water deficiency at a critical stage of growth, not necessarily due to a simple physical lack of water in the soil.

The extent of the disorder in Ireland is not yet known but it is considered unlikely to be of any practical importance. A four acre block in the affected area in Bansha forest was the site of an experiment intended to compare several methods of manual ground cultivation before planting and the effects of different phosphatic fertilizers applied at the time of planting. No differences can now be detected between the various treatments, but the block as a whole now carries perhaps the best crop of *Pinus contorta* in Ireland.

It is understood that an excursion to Bansha forest will take place during the coming summer, when members will have an opportunity to see the area for themselves.

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Review

Foresters Engineering Handbook.

By E. R. HUGGARD, B.A.I., A.M.I.C.E.
(Cambridge, W. Heffer & Sons Ltd. 18s.)

THIS is a most useful book for foresters. It must be emphasised, however, that it is merely a handbook and not a substitute for technical advice by engineers in the field. It is, however, an excellent guide to foresters on many technical problems and the author has avoided involved engineering calculations.

The necessity for layout of the entire road system before planting is well covered. "To ensure access to the maximum of timber with the minimum of roads" aptly sums up the layout problem. The author's approach to the question of road density is a practical one, although it might, perhaps, be argued that there will be some difficulty in valuing a crop before it is planted! His handling of the subject certainly highlights the necessity for some form of calculation to ensure that there will eventually be a worthwhile credit balance on the sale of a particular crop over the years.

His figure of 1 in 6 for maximum road gradients is too steep. On layout of approximately 150 miles of forest road generally over the most difficult terrain in this country the maximum gradient which surveys proved necessary was 1 in 8 *and this was very seldom used.* 1 in 10 is the normal maximum.

Very useful data is given on the requirements of road curves to take heavy haulage traffic. This is a very important aspect of the work as mistakes in setting out such curves will be costly to remedy later.

The protection of road sites from water damage is fully described. In this connection, it is not necessary to construct a special roadside drain ("water table") where the road foundation has been properly cambered, as the foundation camber in itself will afford the necessary drainage.

I wholeheartedly agree with his advice on the caution which should be exercised in using formulae to calculate water run-off from known areas of catchment basins. Such a formula is essential for a guide but alternative site checks must be made, for information on highest flood measurements. For small streams not marked on the ordnance survey sheets it is often very difficult to ascertain catchment areas in grown timber.

The recommended use of cement mortar or concrete for jointing and setting of concrete pipe culverts is usually unnecessary, where

(1) pipes are made to Irish Standard Specification,
(2) have a cover greater than the pipes external diameter, and
(3) are properly surrounded with well-packed fine clay or gravel.

Concrete "sealing" walls may sometimes be required at both ends.

In his treatment of fords, he has not mentioned what is probably the cheapest type of construction, i.e. corduroy surfacing with thinning poles anchored with wire to heavier timbers buried in the stream bed.

"Gravel" road construction gets very little space. However, this is a most difficult subject to write about and any attempt at giving a general specification would be dangerous. The limit of 4" depth for *all gravel roads* set by Mr. Huggard has been disproved on many of our Irish forest roads in the recent past. Depths depend on the bearing capacity of the subsoil and a very common depth of gravel is 8" to 12" without any heavy soling but with small stones raked into the ruts. Depths up to 2' may be required on bog.

The author emphasises the necessity for sufficient supervision of heavy machinery by pointing out that the output from a D.7 type dozer is equivalent to that of seventy men. His recommendation as to the most suitable size of bulldozer for forestry work is borne out by our experience here.

The method of determining the necessary depth of the surfacing material by noting failures under construction vehicles is the only practically economical system. This ensures that the *minimum of material is used* and *costs are, therefore, kept as low as possible.* Construction traffic normally causes more wear than any subsequent timber traffic because it is more concentrated and the road site is not well consolidated until after construction.

There is a very useful chapter on bulldozers. Figures are given for output of the various types under ideal conditions and costings per hour are provided. This data is a help toward estimating cost of construction work.

Useful hints are given on the general use of bulldozers. The versatility of the excavator is well illustrated, though the author does not mention the advantages of this machine for levelling road sites on sloping ground where either the soil is too soft or there is too much rock to permit bulldozing; neither does he mention its use for excavation of roadside drains through soft bog. Light towed graders and towed rollers have proved very satisfactory for maintenance of gravel road surfaces here and in his comparison of towed with powered machines Mr. Huggard does not mention the fact that because of their low initial cost and absence of maintenance costs, the towed machines can better afford to be idle for long periods. Neither is a problem created in finding alternative work for an operator in the case of the towed machine.

Special detachable grader blades which can be rigidly attached to the ordinary wheeled tractor are not mentioned but these may not yet be in common use.

Some very useful figures are given for the dimensions of beams required for simple short span bridges. Simple construction details are also given for beams and decking. Supporting walls cannot be satisfactorily dealt with because these have to be designed specially to suit

the particular circumstances e.g. they may or may not be retaining walls as well as supports; heights will vary, foundations differ, etc.

Calculations for light suspension bridges are given in simple form. This type of bridge is suitable for deep ravines with very steep faces. Blasting is dealt with briefly but quite a lot of useful information is given. The output of rock given per lb. of gelignite is very high for normal quarrying. Output will depend on conditions, average depth of holes, spacing, etc.

Brief notes are given on the construction of one type of retaining wall with coefficients to allow for varying dimensions and materials.

There are very good graphic illustrations of the use of reducing gear for lifting heavy loads in the field.

The various methods of timber extraction are discussed and extraction economies are well described. He indicates that the aerial ropeway is not an economic method except in the more inaccessible places. An important argument against the aerial ropeway not mentioned, is the difficulty in getting merchants to buy *standing* timber in a property where extraction must be by this method.

Incidentally, figure 26 illustrating tractor and sulky appears to be missing.

Some good general notes are given on map reading and surveying. He points out that a practised map-reader can obtain a general mental three-dimensional picture from a contoured map. This is essential for successful economic road planning, reading of catchment areas etc., and it is surprising the number of people who use maps regularly but cannot see the third dimension *automatically*. The book is completed by an interesting chapter on aerial photography for survey purposes. Wonderful developments have been made in this type of surveying in England since the war and contours at one foot intervals can now be plotted from aerial photographs by commercial companies. The author concerns himself chiefly with the principle of the system and the method of interpreting from the photographs. He gives a lucid description of a highly technical subject.

Priced at 18 shillings, this book is very good value. Every forester, estate agent and timber merchant should have a copy.

K. F. McGarry, B.E.

Excursion to Athenry Forest.

ON August 24th, 1958 the Society of Irish Foresters visited the Derrydonnell property of the Department of Lands forest at Athenry. Despite the bad weather the members, including some from Northern Ireland, enjoyed a particularly stimulating and interesting excursion.

The party assembled at the entrance gate on the Galway road where the leader gave a brief account of land use prior to acquisition, and a history of treatment and management since acquisition. The forest comprises one block of 509 acres in the townlands of Tobberoe and Palmerstown. Elevation is 100 feet to 150 feet. The soil varies from brown earth directly over limestone pavement to permeable boulder till, light glacial gravels mostly derived from limestone and some limestone outcrop and crag on the hilltop. On the high ground leaching is very pronounced in the upper soil horizons as might be expected in this high rainfall area. The typical plant of these leached soils—juniper—the luibar creige of the West—is very much in evidence, closely associated with strong *Calluna, Molinia,* and *Deschampsia.* On the better pockets *Rubus,* bracken and some agricultural grasses flourish.

The first planting took place in 1936 and was completed in 1937. The selection comprised mostly Scots pine/beech/European larch with pure plots of *Pinus radiata,* Lawson cypress and Japanese larch as ground dictated. The plantation, for about half its total area may now be considered a failure, although it flourished for the first five years after planting, a fact borne out by records which show no beeting up operations in the first ten years save replanting beech cut by hares. Pine sawfly and pine shoot beetle attacked in epidemic propoprtions from the eighth to the twelfth year resulting in large patches of Scots pine dying off, and leaving the plantation a sorry sight, stunted and practically needleless.

Now that the plantation looked a complete failure, an attempt to rehabilitate with *Pinus radiata, Pinus contorta* and Corsican pine was made, and since then at various times *Pinus radiata,* beech and European larch have been introduced. At present some 90 acres are being treated. Some manurial trials with basic slag carried out in 1953/54 have not proved helpful. Thinning has been carried out in *Pinus radiata,* Japanese larch and Lawson cypress, and in the better parts of Scots pine stands, which are few.

The party's first stop was at the *Pinus radiata* plot in Compartment 1, where discussion immediately centred on the soil profile, the pit specially opened showing 9-11 in. of brown earth over limestone pavement. Mr. Scully thought that *Pinus radiata* would not find a safe anchorage here on a 50 year rotation. The stand, planted in 1936 now carries 300 stems per acre, has a volume of 3,390 H. ft. O.B., a mean B.H.Q.G. of 9½ in. and a mean height of 49 feet. This was considered

a very good return for the age of the stand. Discussion veered round to the old *Pinus radiata* bogey—transplanting. Mr. Collins favoured balling even though the cost was high. The new type peat/nitrogen impregnated pots were mentioned. Mr. Swan thought that the advent of polythene bags would reduce losses as plants would travel better with moisture conserved. Another member gave it as his experience that large 1 + 1 + 1 transplants, transplanted better than 1 + 1 plants, but thought the key lay in having minimum delay from lifting to planting out. The advanced transplant view seemed to have something to recommend it as the local County Committee of Agriculture used considerable amounts of the species in this advanced stage and had considerable success, often on diverse sites.

The Japanese larch stand produced the eloquence of the day. The stocking was 540 stems per acre, carrying 1,720 H. ft., a B.H.Q.G. of 5 in. and a mean height of 42 ft. It had already been thinned twice. Some members thought that much fuller use could have been made of this species in the property. One member thought that as the crop was now getting into the real wind zone that height growth would tend to fall off abruptly. Mr. Scully recommended that the stand be reduced to 60-70 trees per acre within the next 5 years and group underplanted with Douglas fir and *Tsuga.* Mr. Dallas said he had often heard this recommended but had never seen it practised. The merits and demerits of this treatment were then discussed and there was general agreement that the opening up and underplanting would produce a more valuable crop, make fuller use of soil horizons and help stratify the canopy.

After traversing the main block of woodland the last stop was at a 3 ft. deep pit in Compartment 7, where the profile revealed a glacial gravel with a 6 inch leached top horizon. The whole looked permeable and a good rooting medium, and carried dominant *Calluna/Molinia/ Deschampsia* vegetation, with occasional juniper. The Scots pine, which covers most of this property, was very poor at this, the highest point of the ground (150 ft.). Over considerable areas large patches had died out or checked badly. The best plot of Scots pine in the property gave a stocking of 640 stems per acre, 480 H. ft. per acre, mean height 22 ft., and B.H.Q.G. $3\frac{1}{2}$ in.

Immediately an inquest was opened, Mr. Swan suggesting that the dieback could be attributed to the high lime content of the soil, roots having penetrated through the leached upper layers to the lime rich subsoil, but in conflict with this there was a good crop of Scots pine (20 years old) at another property of this forest on apparently the same type of site. The fine Scots pine stands at Cong Forest were also cited as proof that the tree will grow on soils overlying limestone. Some members suggested exposure. Quite a few members thought that while the immediate cause was exposure, basically the trouble was a provenance one, as the fine stands of Scots pine here and there along the western seaboard were examples of the tree growing under similar or even more pronounced adverse conditions—high wind speeds and moist

salt laden winds. A provenance trial with plants raised from these fine stands was thought to be well worth while. As to suggestions for future treatment of the crop, opinion varied and such species as *Pinus contorta* (of which some had been introduced in beeting up some 10 years ago and was now well above anything in the original crop) *Abies nobilis* and common silver fir were mentioned and among the undercurrents one could hear *Eucalyptus urnigera* mentioned. Some members thought that the planting of Scots pine should be discontinued until more information was available about the provenances of this species. A general remark as the party filed away to the cars was that the advent of the "research fellows" would throw welcome light on some aspects of this unsatisfactory crop, both above and below ground level, while more were heard to say that the choice was and is ecologically correct for the site.

Mr. O'Donovan, who represented the Minister for Lands, provided a welcome cup of tea after an interesting tour. Mr. Swan thanked all concerned with the outing.

T. DE GRUNEIL

Day Excursions for 1958.

IN addition to those reported in full in this and the previous issue, six day-excursions were held during the summer and autumn of 1958.

On May 17th the Society, by kind permission of Viscount Powerscourt, visited the famous Powerscourt gardens, where, under the leadership of Mr. A. M. S. Hanan, members saw and examined many rare species of exotic conifers and hardwoods.

A joint excursion with the Sligo Field Club to the Union Wood property of Collooney State forest, Co. Sligo, was held on June 29th. The leader was Mr. P. J. Collins. The main interest here was the problem of converting scrub-oak to conifer forest without undue interference with the amenity value of the woods.

The excursion on July 13th, led jointly by Messrs. A. M. S. Hanan and P. M. Joyce, was held in Togher Wood, Portlaoise State forest, and was devoted to the demonstration and discussion of methods of forest mensuration.

On August 10th Mr. J. O'Carroll led an excursion to Aughrim State forest where the visitors saw and discussed the performance of different species (Japanese larch, Douglas fir, and *Abies grandis*) on similar sites.

Two excursions were held on September 14th. In the Callowhill property of Delgany State forest one group of members, led by Messrs. O. V. Mooney and J. Doyle, saw crops of 26 year old pines (Scots pine, Corsican pine and inland and coastal varieties of *Pinus contorta*) and compared their behaviour on this exposed site. The subject of discussion at Killeagh State forest, Co. Cork, on the same day, was the conversion from old estate hardwoods to conifers. The leader was Mr. J. J. Maher.

All excursions to State forests were held by kind permission of the Minister for Lands.

SOCIETY OF IRISH FORESTERS

Statement of Accounts for Year ended 31st December, 1958.

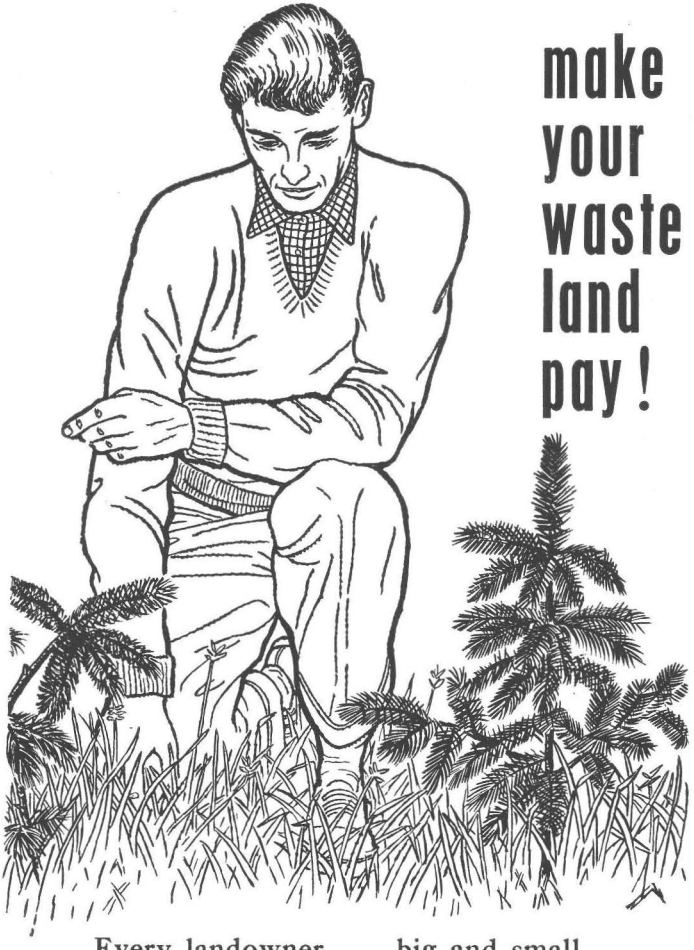
1957.	Income	£ s. d.	£ s. d.
£488 11 0	To Balance from last Account	490 10 0	
£18 5 7	Less amount due to Secretary	30 9 3	
£470 5 5			460 0 9
	„ **Subscriptions received :—**		
	5 Technical Grade 1. 1956	5 0 0	
	10 „ „ „ 1957	10 0 0	
	48 „ „ „ 1958	48 0 0	
	3 „ „ „ 1959	3 0 0	
	6 „ Grade 2. 1956	3 0 0	
	20 „ „ „ 1957	10 0 0	
	71 „ „ „ 1958	35 10 0	
	24 „ „ „ 1959	12 0 0	
	1 Associate 1955	15 0	
	4 „ 1956	3 0 0	
	17 „ 1957	12 15 0	
	86 „ 1958	62 12 0	
	1 „ 1959	15 0	
£195 15 0			206 7 0
£6 5 0	„ **Interest on Investments**		6 5 0
£232 15 7	„ **Journals sold and advertisements**		280 15 5
£15 0 0	„ **Donation. Irish Forest Products Ltd.**		15 0 0
£19 14 10	„ **Excursion Account**		21 16 11
£939 15 10			£990 5 1

1957.	Expenditure	£ s. d.	£ s. d.
£69 3 9	By Stationery and Printing ...		76 12 11
	„ Printing of Journal ...	352 16 3	
	„ „ Index on 1st 10 Volumes ...	40 13 0	
£283 6 0			393 9 3
£31 7 2	„ Postages		51 5 4
£64 13 0	„ Expenses re Meetings ...		103 0 8
£1 5 2	„ Bank Charge		1 1 0
£15 0 0	„ Honorarium—Secretary ...		15 0 0
£15 0 0	„ Prizes		—
—	„ Sketch of proposed Society Badge		5 5 0
£490 10 0	„ Balance in Bank	351 13 7	
£30 9 3	„ Less amount due to Secretary	7 2 8	
£460 0 9			344 10 11
£939 15 10			£990 5 1

I have examined the above Account, have compared same with vouchers and certify it to be correct, the balance to credit being £344 10s. 11d. 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 1957 £10 10s. 0d., and for 1958 £53 13s. 0d., which were outstanding at 31st December, 1958.

19th January, 1959.

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



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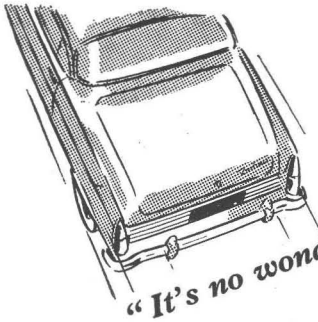

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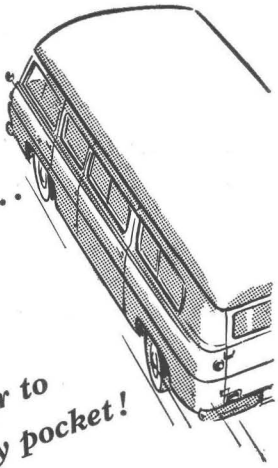

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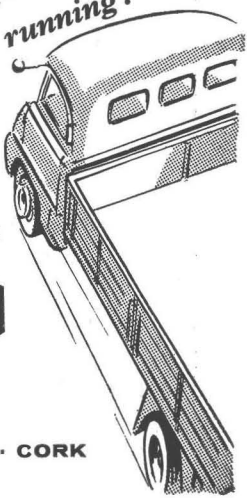

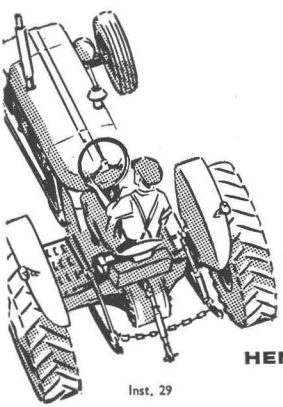

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