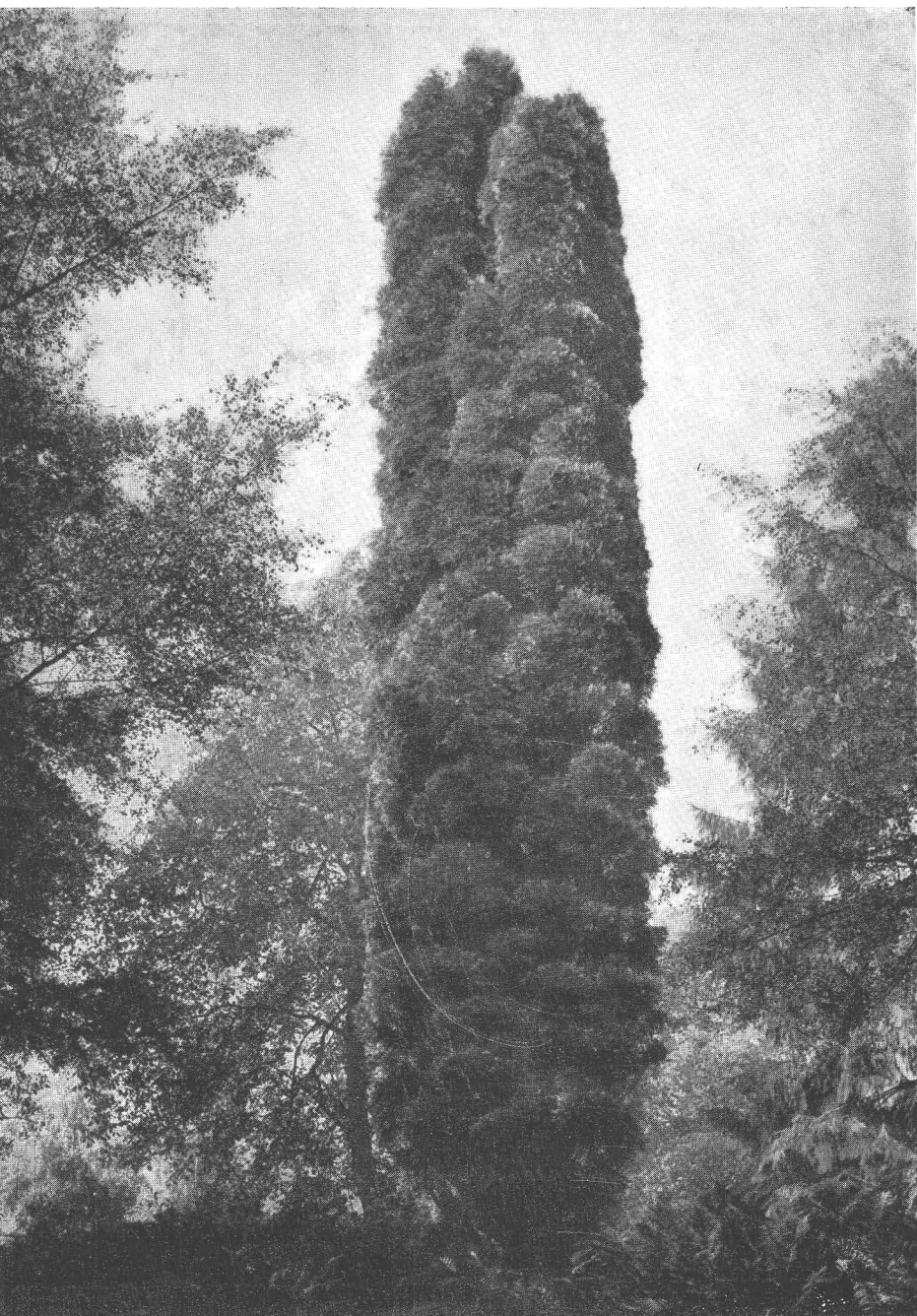


IRISH FORESTRY



Vol. VIII. No. 1

JUNE, 1951

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IRISH FORESTRY

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NUMBER I.

CEDRUS DEODARA AT GLENGARRA

By O. V. MOONEY, B.AGR.SC.

THE subject of this note is a small but remarkable stand of *Cedrus Deodara* which is situated on the side of a remote mountain valley which cuts deep into the southern slopes of the Galtee Mountains in Tipperary. This stand is now the property of the Dept. of Lands, Forestry Division and forms part of Glengarra Forest.

Location.

The approach on the ground can be found through a lodge gate just south-west of Glengarra bridge, which is situated about half-way between Mitchelstown and Cahir on the main Dublin-Cork road. Cahir, which is a little nearer than Mitchelsown, is about nine miles from Glengarra bridge. The way from the main road to the Cedar stand (which is really an old avenue) is nothwards along the bottom of a most impressively beautiful river valley where some remarkably fine specimens of Scots Pine, European Larch, Norway Spruce, Silver Fir and Cedar can be seen in passing; but the walk is most renowned, and very rightly so, for the range and magnificence of its bordering rhododendrons the splendour of whose flowers in spring can only be underrated by any attempted description. The avenue finally comes to an end at an old shooting lodge known as Mountain Lodge (nearly two miles from the main road) and now an An Oige hostel. The place is very well worth a visit. The river of this valley is the Burncourt river whose source is a little more than two miles further to the north-west at the foot of the Galteemore peak 3,018'.

History and Past Treatment.

Of the early history of this stand nothing concrete could be found as no records were procurable. This is greatly to be regretted as an account of any stand is incomplete unless accurate recordings of some sort can be made, of the origin of seed and plants, the type of ground planted, the method of planting, and so on.

The planting was done some seventy years ago by the Butler family of Shanbally who owned the woods in the locality up to recent times. The planting lines appear to have run across the slope and, though

there is not sufficient evidence to deduce the exact spacing of the original planting, there are indications that the plants were put in at six feet apart. There are prominent flattened ridges within the wood running up and down the slope of the ground which would seem to suggest that the ground was cultivated at one time, probably by potato drills, but at first sight these ridges were associated with the method of planting. There is nothing with which to fill the gap between 1880 and about ten years ago when the Dept. high-pruned the area then owned by them to about 20'. Apart from this operation nothing was done since except to cut windfalls off root when they blew down in the valley bottom where there is a patch of soft ground.

Climate.

The annual rainfall for the locality is about 45". Heavy falls of snow are not usual but the high lying ground of the district is subject to occasional south-westerly gales of high velocity.

Soil and Vegetation.

The soil is Old Red Sandstone drift—a light stony well-drained soil of good depth. A shallow 4" layer of brown earth seems to be prevalent at the surface. Over this there is a raw humus layer of 1" to 1½" in which there seems to have been exceptionally little decomposition of the needles and the line between it and the surface of the mineral soil appears particularly sharp. Podsolisation was not evident. The vegetation in the wood is sparse and is mainly composed of a moss carpet in which *Polytrichum* was prominent and occasional small herbs of which *Oxalis* was most noticeable. Taller plants were represented mainly by erratic bracken (*Pteris*), briar (*Rubus*) and fox-glove (*Digitalis*). The vegetation outside the wood on the north side was luxuriant with grasses, briar and bracken.

Aspect and Elevation.

The aspect of the ground is south-westerly on a steep slope which rises from about 680' at the lower side of the stand to about 760' at the upper edge. The wood is not very exposed except on its N.E. side where it is open to north and easterly winds.

The Stand.

The wood covers about 1½ acres and one's first impression is of a vigorous healthy stand with an ideal amount of growing space for each tree. This impression is confirmed by more detailed examination and though the growth in general has fallen off in recent years the leaders and crowns of the trees have a very healthy and vigorous appearance. As mentioned before one part of the stand has been pruned up to about 20' but the remainder (which was only recently acquired by the Dept.) was not pruned. In the latter area dead but firmly attached branches are retained on the trees almost down to

ground level. This fact together with other observations suggests that the stand was unduly open from an early stage in its life. The average tree bears a live crown down to from 35 to 40 feet above the ground but the canopy is only semi-closed and there is abundant light in the stand which fact contrasts strangely with the sparse vegetation on the floor of the wood. Although it is now about 10 years since the pruning was done the bark has not closed over the pruned branches—due no doubt to the age of the trees and in lesser part to the old branches which were abnormally thick for pruning.

About 12% of the trees in this wood are forked low down at from 2' to 4' above ground level and many roots bear two fine tall stems (7" to 9 $\frac{3}{4}$ " Q.G.B.H. \times 50' Approx.). Whether this forking is due to some damage by animals or weather in early life or to the natural habit of the species is not known.

The taper of the Cedars, in spite of their age, appears to be small, but no detailed investigation into this quality of the crop could be achieved. Random Pressler borings of average sized trees revealed periodic ring growth similar in pattern to European larch. In the absence of sufficient span to illustrate this may best be indicated as follows:—

First ten years' growth 1 1/16".	Second ten years' growth 3 1/16"
Third ten years' growth 2 6/8".	Fourth ten years' growth 2 1/16"
Fifth ten years' growth 1 3/16".	Sixth ten years' growth 2"
Last seven years' growth 6/8".	Total 67 years.

So far as can be seen the only unusual item in the above analysis is the 2" growth in the sixth decade and this may have been due to some thinning factor. Stumps, old or new, are remarkable for their absence and this is further suggestive that the crop has stood in its present open state for some long time past.

The following figures indicate well how fine a crop of trees is this Cedar at Glengarra. The mean Basal Area tree was found from measuring 30 trees in a line across the middle of the wood. The number of stems per acre was found by averaging the number of stems per acre on two 1/10th acre squares located in the middle of the wood. The measurements were made three years ago when the stand was 67 years old according to ring count.

Age 67 years.

Stems Per Acre 160.

Mean Basal Area Tree 14 $\frac{1}{4}$ " Q.G.B.H.

Total Ht. of Basal Area Tree 68".

Live Crown Ht. Over Ground Level 38' (Dead branches retained to ground level).

Total Timber Ht. Of B.A. Tree 48' (Calculated to 6" diam. Volume would have been greater by calculating to 3" but the tops were very rough).

Mid Q.G. of Mean B.A. Tree $10\frac{1}{2}$ ".

Volume Per Acre. 4,762.8 c. ft. Hoppus.

Mean Annual Increment 71.08 c. ft. Hoppus.

Higher volume figures were obtained from a 1/10th acre plot measured at the same time and from a Census of Woodlands which was carried out a few years before, both of which showed a V.P.A. of well over 5,000 cubic feet. The V.P.A. figure of 4,762.8 may therefore be considered conservative.

Comment.

Comparison shows that this Cedar crop falls easily into first quality Scots Pine (Scotland) (B.F.C. Yield Tables) when judged by volume production, but it falls far short of first quality when judged properly on height growth according to age. When compared with European Larch it is found that on a basis of volume the Cedar falls into second quality class, but the contrast as to height growth is still more marked in this case, the Cedar falling below third quality class B.F.C. yield tables.

This Cedar at Glengarra impresses one most as to the bulk of the individual tree in the stand and in the manner in which they hold their girths so well up to about 40'—this, apart from their apparent vigour and health. Having taken into consideration the retention of dead branches for so long and to such a low level and the other factors enumerated above, not least the relation of height to volume, it seems not unlikely that the planting distance was greater than six feet in the first place, or that there was some species in mixture which failed, or that considerable failures were caused in the early stages by some damage being done to the young crop resulting in the trees being widely spaced for the greater part of their life.

Seed.

A fine crop of cones is borne on these Cedars in favourable years. Seed was extracted from twelve cones which were collected in the autumn of 1944. Thirty selected seeds were sown by the writer in the spring of 1945 from which three seedlings, two of which still survive, were obtained. The remainder of the seed was sent to Avondale where a few more seedlings were obtained and the transplants are still to be found in the garden nursery there. It seems indicated that as many seed collections as possible should be made from these trees before they start to decline.

Conclusion.

There seems to be one definite conclusion to draw from the foregoing observations: that the cultivation of *Cedrus Deodara* as a forest crop deserves much more of our attention than it has had in the past.

General Note on Species.

The Deodara (*Cedrus Deodara* Loudon) is a native of the West Himalayas, extending westwards through Kashmir and on to Afghanistan. It is not generally found naturally in pure stands but is found in mixture with *Picea morinda*, *Pinus excelsa* and various oaks. Its maximum range of elevation is from 4,000' to 10,000' in its natural habitat but it is more usually confined to from 6,000' to 8,000'. It finds its region of optimum growth where the rainfall is between 40 and 75 inches.

A tree of 250 feet was recorded by Schlich in the Himalayas but these trees live to a great age in their own country, some standing trees being estimated to be 400 years old. Normal growth under these conditions is said to be 8 to 12 annual rings to the inch—which seems to indicate that growth here is faster but only sustained for a comparatively short period.

The seed of *Cedrus Deodara* was introduced into Britain by Leslie Melville in 1831. In 1841 seed was sown on a big scale and the plants were widely distributed throughout estates in Britain. Subsequently it was noted by many observers that trees suddenly failed in or about from 40 to 50 years and the species was said to be vulnerable to frost and the cold damp English climate. It appears from the context of these remarks that they applied to single park or avenue trees and very little information of solid stands seems to be available.

A tree of 84' \times 7' 2" girth was recorded by Professor Henry at Fota, Co. Cork in 1904 and was later recorded by H. M. Fitzpatrick at 85' \times 8' 11" about 1928. Other fine trees recorded by Mr. Fitzpatrick were 76' \times 8' 9" at Carton (Co. Kildare) 79' \times 12' at Headfort (Co. Meath). The best tree recorded in Britain in Henry and Elwes was 90' \times 9' 1". Doubtless these dimensions have been far exceeded long since by more recent recordings.

The timber of *Deodara* is said to be very durable when grown in its natural habitat. It is hard, oily and scented being used for building, sleepers, furniture and for many other purposes.

Some doubt has been thrown on the quality of the timber when grown in the climate of these islands and it is said to be soft and to lack durability.

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DOUGLAS FIR IN CO. WICKLOW

By T. CLEAR, B.AGR.SC.

THE "green" Douglas Fir (*Pseudotsuga taxifolia*) is a native of the Pacific coastal region of the United States and Canada. It grows best in the coastal region of Oregon, Washington and British Columbia, where the climate, and more particularly the rainfall, is very similar to that of the Wicklow mountains. European foresters came early to the recognition of its possibilities as a timber tree. Its remarkable growth in its native habitat and the high quality of its timber won for it a high reputation even among the coniferous giants of the "fog belt". It was introduced to Europe in 1827 but was not planted to any extent before 1850.

Early plantings were as single specimen trees and small groups in Arboreta, on avenues and in selected spots in open woodland. The results of this type of planting are to be seen in many parts of Ireland, particularly in demesnes like Powerscourt, Carton, etc.

The growth of the specimens thus planted at Kilruddery was most remarkable and by the beginning of the present century Douglas Fir was well on the way to becoming a firm favourite in the race for pride of place among the newer exotics. After seeing the giants at Powerscourt and Carton one can well understand the superoptimism that prevailed with regard to this species some 40 or 50 years ago.

Its extensive use as a forest tree coincided with the advent of State Forestry in Ireland. Much of its early planting was on old woodland sites as at Dundrum, Avondale, Camolin and was usually in mixture with larch or spruce. On private estates it was used as a filler in sparsely stocked hardwood areas, and with *Abies grandis*, *Thuja plicata*, *Picea sitchensis* and other of its natural associates began to give a new look to many demesne woodlands. A most remarkable example of this type of planting is to be seen at Carton and deserves the closest study by our silviculturists.

With the advent of the 1914/18 war planting practically ceased and was not renewed on any appreciable scale until 1921. The post war plantings differed in many respects from the pre-war efforts. Large areas of sheep mountain and cleared woodland, particularly in Co. Wicklow, were acquired and extensive monocultures of Douglas Fir, Sitka Spruce and other promising exotics began to make their appearance. The green Douglas Fir was used extensively in those early post-war plantings, and figured largely in the selections as at Roddenagh in Aghrim (Planted 1921-1926); at Ballyboy in Glenmalur; and at Crone and Ballyreagh in Glencree.

The site requirements of Douglas Fir were early recognised and moderately deep, light well-drained soils containing ample moisture and which were fairly well sheltered were selected for this species. These site conditions were prevalent in the early acquisitions in Co. Wicklow and in south-east Ireland generally and are asso-

ciated with lower Silurian, mica schist and the better old red sandstone rocks. Heavy bracken on bare land and a variety of ferns in old woodland were considered indicators of good Douglas ground. With the advent of more extensive planting programmes attention to the site requirements became less rigid and Douglas Fir was planted at higher elevations on exposed light "grass heath" sites where furze (*Ulex europaeus* and *Ulex galii*) and heather (*Calluna vulgaris*) were all too prone to become dominant when the ground was enclosed against stock. It was planted also on lowland limestone areas where frost was an important factor as was also the heavy growth of aggressive meadow grasses such as Cocksfoot.

This departure from sound selection of sites could have but one result—poor crops. These "ecological errors" were so numerous, however, that Douglas Fir came to be regarded as an unreliable species and quickly lost in popularity. The promised heavy yields did not materialise. The species was prone to flatter but to deceive—starting vigorously enough but checking in the thicket stage and producing an unwanted quota of wolves—with a pronounced sweep in the butts and very aggressive side branches. The advent of the insect *Chermes Cooleyii* and the leaf-cast fungus (*Phaeocryptopus Gaumanii*), and the frequent reports of extensive wind throw and snow break added to the general uncertainty. Adding to the long list of troubles associated with this species, the blue or Colorado Douglas Fir, a very inferior tree, was sometimes planted in mistake for the Vancouver variety. Small wonder then that Douglas Fir fell from its relatively important position among forest tree species to one of minor importance in Irish Forestry and disappeared almost completely from State nurseries. The reaction went further and a policy of replacement of unsatisfactory stands of Douglas Fir became the order of the day.

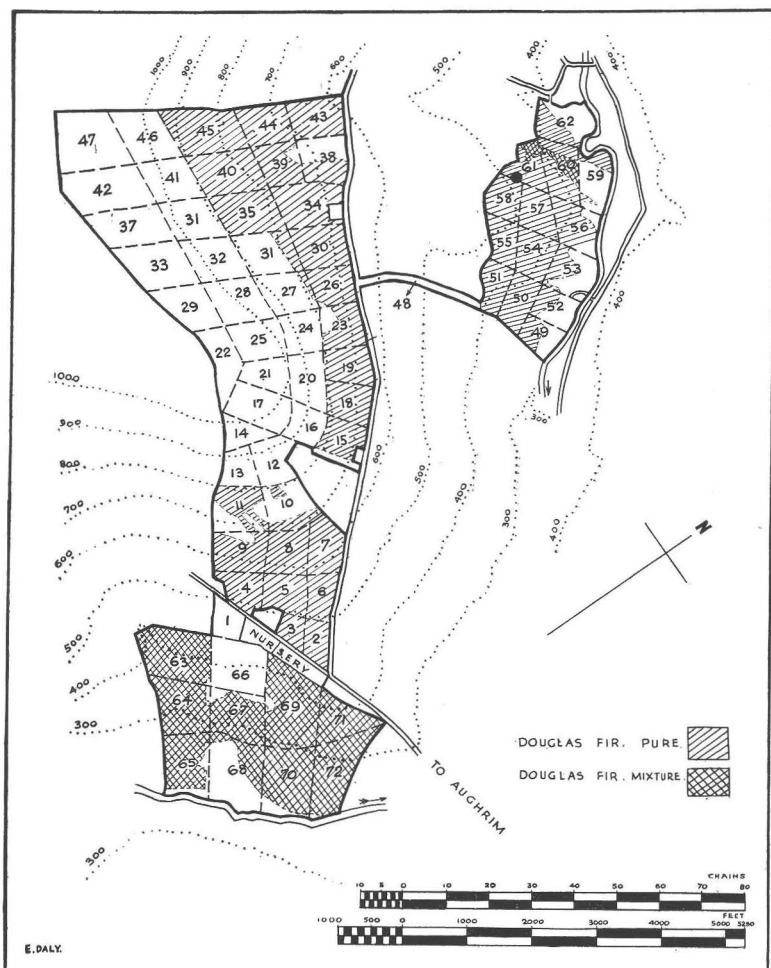
During the war the unprecedented demand for fuel enabled foresters to carry out extensive improvement cuttings of crooked and coarse dominants in young 15-20 year old stands. This work has done much to rehabilitate the Douglas Fir in County Wicklow and the great improvement apparent in these stands has led to a revival of interest in the species.

In 1948 I undertook the survey and assessment of growing stock in Roddenagh property of Aughrim forest. The area was intensively sampled using the line-plot method with 1/10th acre plots falling every 4 chains. This method of sampling provides growth statistics which could be analysed to provide information on site quality as affected by elevation and other site factors. Numerous sample trees were felled and stem analyses carried out.

In Aughrim Forest Douglas Fir figures largely in the earlier plantings. In Roddenagh and Killaduff (the properties assessed) there are over 300 acres of pure Douglas Fir aged 22-27 years covering a wide range of site qualities.

AUGHRIM FOREST

Roddenagh Property.



The area planted with Douglas Fir lies between the 450' and 900' contours on Roddenagh hill—and between 300' and 400' in Killaduff north. The soil is a relatively light shaley loam of Silurian origin only slightly podsolized, fairly deep at lower levels, but becoming shallower and lighter and more podsolized with increased elevation. Compartments 2-11 face south to south-east and are fully exposed. The contours are convex and the site could be described as a bold dry exposed ridge which is an outlier of the Wicklow range with little or no shelter from higher ground to the south.

Compartments 15, 18, 19, 23, 26, 30, 34, 35, 38, 39, 40, 43, 44, 45 face north-east to north and are fairly sheltered with the concave outline of the map contours indicating better moisture conditions, as also does the occurrence of springs and a patch of seepage in Compt. 38. Planting of Douglas Fir was taken up to 900 feet on this sheltered side. There are no records of the native vegetation of the site before planting but Irish furze seems to have dominated the dry S.E. ridge (C. 2, 3, 5, 6, 7, 8, 9, 10, 11). Bracken occurred on the moister and more sheltered northerly slope and grassheath vegetation was general above 800'.

Planting commenced in the season 1921-22 and was carefully supervised and thoroughly done. The planting stock was (2—1—1) 4 years old transplants and the spacing was 6' \times 6'. Growth was rapid from the start as judged by a stem analysis of average dominants. Ring width was about 4 rings to the inch up to 1930 when there is striking evidence of check in some parts of the plantation. For 3 or 4 years rings of 1/16" occurred followed by an improvement to 1/8" which was maintained up to 1937 when a further check occurred giving rings of 1/32" for 3 years. This check was general over the whole area of Roddenagh Hill. There was an improvement in 1940 to 1/16" which increased to 1/8" in 1942 and to 3/16" in 1944. Then growth fell off gradually until in 1947 ring width was again 1/16". This succession of check followed by release is even more striking on the co-dominants while the sub-dominants have been in full check since about 1940.

The first check appears to have been caused by excessive competition from furze the cleaning of which was neglected for some years. This check was most pronounced on dry ridges and at the higher elevations. A heavy cleaning carried out in 1933 or 1934 was in the nature of a thinning in its silvicultural affect—many trees had been suppressed and the furze was well up into the canopy according to the officers-in-charge at the time. The second check in 1937 could be accounted for as being normal and due to root competition indicating that thinning should have been carried out in 1935 or 1936 i.e. 13 or 14 years after planting. The check was so severe, however, that one is inclined to the belief that leaf shedding must also have been excessive about this time. Stands of Douglas Fir about 15 to 18 years old are often condemned because of general stagnation by excessive loss of foliage. It

is interesting to observe that this condition prevailed in Aughrim for some years. The general improvement which set in in 1939 or 1940 coincided with brashing operations as evidence of the sawn branch stubs reveals. The assessors attributed the improved growth to a thinning which was presumed to have occurred about this time. However, there was no record of a thinning having been carried out in 1939 and the officers in charge state that the stands only received a brashing. It appears, therefore, that brashing has given a pronounced stimulus to the crop. I am convinced that the mulching effect of the branch litter so improved the moisture conditions as to offset the effects of root competition and disease. The improvement in increment got a further boost in 1942 when a thinning of dominants was carried out.

The crop is now vigorous and healthy and with thinning, increment can be satisfactorily maintained. The trees have doubled in timber volume in the last 5 years. Extensive growth studies reveal annual increments varying from 8% to 15%. For example in Compartment 3 the average dominant increased from 3.62 cu. ft. (U.B.) true volume to 6.07 cu. ft. (U.B.) true volume and the average co-dominant increased from 1.6 cu. ft. to 2.9 cu. ft. over 5 years.

In compartment 4 the average dominant increased from 5.5 cu. ft. to 7.10 cu. ft. and the co-dominant or sub-dominant from 1.28 to 1.62 cu. ft. in five years.

Compartment 3 seems to have been cleaned and thinned earlier than C.4 since the early (1930) check is not in evidence and the stocking is now lower. This as well as the fact that C.3 enjoys a lower elevation, accounts for the better current increment.

The following statistics are based on an analysis of 34 plots of 1/10th acre covering the south-eastern end of Roddenagh Hill (C.2-11). In all cases calculations for Mean Annual Increment include a figure for thinnings which was obtained from the records of the forest.

Age of Crop 27 years :

Average No. of trees over 3" Q.G.B.H.

per acre 475.

Mean area per tree 0.152 sq. ft.

Mean volume (Hoppus measure O.B.)

per tree down to 3" diameter ... 3 cu. ft.

Mean volume per acre 1,425 cu. ft.

Mean annual increment 60 cu. ft. per ac. per an.

Current annual increment (estimated) 90 cu. ft. per ac. per an.

Current growth is more rapid at lower elevations as the following statistics show.

Compartment 3. Elevation (450'—500') :

Average No. of trees	...	...	...	420 per acre.
Volume per tree	...	...	...	3.2 cu. ft.
Average volume per acre	...	...	...	1,660 cu. ft.
Mean height	...	...	...	42'.
Mean crown length	...	...	...	20'.
Current annual height growth	...	...	...	1½'.
Mean annual increment	...	...	...	81 cu. ft. per ac.
Current annual increment based on last 5 years growth	...	...	...	150 cu. ft. per ac.
Current increment %	...	...	...	13%.

Compartment 4. Elevation (500'—550') :

Average No. of trees per acre	...	...	...	472.
Volume per tree	...	...	...	3.55 cu. ft.
Average volume per acre	...	...	...	1,685 cu. ft.
Mean crown length	...	...	...	21'.
Mean height	...	...	...	43'.
Current annual height growth	...	...	...	1¼'.
Mean annual increment	...	...	...	80 cu. ft. per ac.
Current annual increment	...	...	...	94 cu. ft. per ac.

Compartment 5. Elevation (450'—500') :

Volume per acre	...	...	...	1,220.
Mean height	...	...	...	40'.
Crown length	...	...	...	18'.
Current annual height growth	...	...	...	1¼'.
Volume per tree	...	...	...	2.7 cu. ft.
Mean annual increment	...	...	...	60 cu.ft.
Current annual increment	...	...	...	92 cu. ft.

Compartment 7. Elevation (650') :

Mean annual increment	...	...	...	55 cu. ft.
Volume per acre	...	...	...	1,300 cu. ft.
Mean height	...	...	...	36'.

Compartment 8. Elevation (650') :

Mean annual increment	...	...	...	52 cu. ft.
Volume per acre	...	...	...	1,140 cu. ft.
Mean height	...	...	...	36'.

In Compartment 10 and 11 (700'—800') the Douglas Fir has largely failed. The better remnants of the stand remain and the yields of 800 to 850 cu. ft. per acre after 27 years (30 cu. ft. M.A.I.) speak for themselves. These Compartments have been beaten up with J.L. which promises very well on this site.

Compartments 15, 18 19 and 23 are somewhat better sheltered than Compartments 2-11 but the elevation is 650'-800'. The contours indicate excessive drainage and drought is likely to be an important factor. Irish furze played an important role here in checking growth especially in Compartment 23, where partial failure has resulted, necessitating replanting with Japanese Larch.

The "dry ridge" is a most unsuitable site for Douglas Fir and competition from native vegetation is excessive on such sites. Nevertheless Douglas Fir has not done too badly as can be seen by the following results to date.

Compartment 15. Elevation (700') :

Age	...	...	...	...	26 years.
Average No. of trees per acre	...	...	...	...	430.
Average volume per tree	...	...	...	...	2.5 cu. ft.
Average volume per acre	...	...	...	...	1,080 cu. ft.
Mean annual increment	...	...	...	...	41.5 cu. ft.
Mean height	...	...	...	...	40'.

Compartment 18. Elevation (700') :

Average No. of trees per acre	...	...	...	...	415.
Average volume per acre	...	...	...	...	1,245 cu. ft.
Mean annual increment	...	...	...	...	57 cu. ft. per ac.
Mean height	...	...	...	...	36'.

Compartment 19. Elevation (700') :

Average No. of trees per acre	...	...	...	...	400.
Average volume per acre	...	...	...	...	1,100 cu. ft.
Mean annual increment	...	...	...	...	50 cu. ft.
Mean height	...	...	...	...	36'.

Conditions in Compartments 34, 35, 38, 39, 40, 43, 44, 45 are much more favourable. As can be seen by the contour lines this portion of the area is "cupped" and sheltered (the concave contours indicating better moisture conditions and shelter) with better soil depth. The native vegetation was likely to have been bracken rather than furze.

The improvement in rate of growth is quite remarkable considering the stand here is 3 years younger.

Compartment 30. Elevation (700') :

Age of crop	...	...	...	...	23 years.
Average No. of stems per acre	...	...	...	...	567.
Volume per acre	...	...	...	...	1,200 cu. ft.
Mean annual increment	...	...	...	...	62 cu. ft.
Current annual increment	...	...	...	...	101 cu. ft.
Mean height	...	...	...	...	38'.

Compartment 34. Elevation (700') :

Average No. of stems per acre	...	...	676.
Volume per acre	...	...	1,200 cu. ft.
Mean annual increment	...	...	83 cu. ft.
Current annual increment	...	...	155 cu. ft.
Current annual increment %	...	...	14%.
Mean height	...	...	36'.

Compartment 35. Elevation (750') :

Average No. of stems per acre	...	...	643.
Volume per acre	...	...	1,150 cu. ft.
Mean annual increment	...	...	75 cu. ft.
Current annual increment	...	...	116 cu. ft.
Current annual increment %	...	...	12%.
Mean height	...	...	33'.

Compartment 40. Elevation (850') :

Mean annual increment	...	...	70 cu. ft.
Mean height	...	...	30'.

Compartment 43. Elevation (650') :

Mean annual increment	...	...	79 cu. ft.
Mean height	...	...	38'.

Compartment 44. Elevation (750') :

Mean annual increment	...	...	66.5 cu. ft.
Mean height	...	...	40'.

Compartment 45. Elevation (850') :

Mean annual increment	...	...	57 cu. ft.
Mean height	...	...	36'.

These last three Compartments are on the edge of the plantation and subject to exposure.

In KILLADUFF NORTH the Douglas lies between 350' and 500' and while the area is sheltered the ground is rocky and the soil rather shallow in places.

Growth has been very satisfactory as can be seen by the M.A.I. figures.

This area was only 22 years planted on the date of assessment and as one would expect, the current annual increment is very much higher than the Mean.

GROWTH STATISTICS.

Compt.	Age	No. of stems over 3" Q.G.B.H.O.B. per acre	Av. Volume per tree cu. ft.	Vol. per acre cu. ft.	M.A.I. (including thinnings) cu. ft.
49	22	600	2.30	1,380	58
50	"	620	2.30	1,430	95
51	"	610	3.10	1,890	95
52	"	620	3.40	2,110	96
53	"	620	2.60	1,610	74
54	"	535	3.40	1,820	90
55	"	510	3.24	1,650	85
56	"	580	3.10	1,800	92
57	"	705	2.30	1,620	82
58	"	465	3.10	1,440	71
59	"	540	2.85	1,540	69
60	"	510	2.85	1,450	66
61	"	612	2.00	1,224	50
62	"	590	2.90	1,710	78

In this property Douglas Fir has failed on the wet flats—which adjoin the river. There seepage areas were water-logged and carried molinia and tufted Aira grasses before planting.

Douglas fir in mixture.

In Roddenagh Wood—an area very similar to the Killaduff North property—namely old woodland—350-450' elevation fully sheltered, with the soil moderately deep and moist and free rooting—Douglas Fir was planted in mixture with Japanese Larch 50% of each at 6' × 6'. The Douglas has been practically eliminated by suppression and the remnant can be maintained only by the deliberate sacrifice of the more vigorous Japanese Larch.

Growth Statistics :

	Japanese Larch	Douglas Fir
Age of crop	25 years	25 years.
Volume per acre Q.B.O.B. ...	1,720 cu. ft.	530 cu. ft.
Stems over 3" Q.G.B.H. per ac.	360.	211.
Mean Q.G.	5 $\frac{1}{4}$ ".	4 $\frac{1}{2}$ ".
Heights of dominants	47',	52',

There were many sub-dominant Douglas Fir—with heights around 40'.

It is still possible in this stand to produce a final crop largely composed of Douglas Fir but it involves a sacrifice of the main increment producer—the Japanese Larch. On the point of quality of final produce there is much to recommend a pro-Douglas Fir policy. In this connection the following experience may be of some interest. The freshly cut samples taken for stem analyses (discs 2" thick cut off at 5', 15' etc.) were stored in sacks for some days before being collected for examination. When examined the Japanese Larch sections were found to be covered with a dense mat of fungus mycelium and the wood was deeply stained and almost black in colour right through. The Douglas Fir showed little or no trace of discoloration and were as bright and clear as when cut.

CONCLUSIONS.

The main conclusions that one is tempted to draw from the results of this assessment might be listed as follows :

- (a) Douglas Fir even under fairly suitable conditions is not likely to be a very heavy yielder on the foothills of County Wicklow.
- (b) It is, however, much superior in growth rate to the normal alternative selections, European Larch and Scots Pine.
- (c) It is inferior in height growth to Japanese Larch in the early stages, at least, but promises to give a much better quality timber: further the evidence from stem analysis would indicate that while the Douglas Fir increment is well maintained between the 20 and 30 years that of Japanese Larch tends to fall off.
- (d) Douglas Fir is extremely sensitive to drought and to root competition. An aggressive vegetation like *Ulex Gallii* on dry exposed sites can bring the crop into complete check. This condition is aggravated by the disease *Phaeocryptopus Gaumanii* which delays canopy formation.
- (e) Douglas Fir shows good powers of recovery from disease and check, and is much superior to Scots Pine in this respect.
- (f) There are indications that the cleaning of furze and other competitive vegetation must on no account be neglected.
- (g) The brashing of the crop appears to have a most invigorating effect and at a critical stage, and this may help to put this operation in a new and more favourable light.
- (h) Early thinning (starting at the 15th year after planting) and the reduction of numbers to between 400-500 stems by the 25th year seems to be very necessary if increment is to be maintained.
- (i) The fact that co-dominates and sub-dominants show very little response to crown thinning would seem to indicate that a heavy low thinning might be more suitable than crown thinning.

Since carrying out this survey at Aughrim, further assessments have been concluded at Glenmalure in central Co. Wicklow and at Glencree in North Central Wicklow in 20 to 30 years old stands and at Kilruddery (near Bray) in 30-40 years old stands.

The results have helped to confirm the general impression that Douglas Fir in heavily thinned stands improves enormously between the 20th and 40th year: that it gives promise of good yields on sites up to 700' on northern slopes especially on deep loamy soils: and that it appears to throw off the effects of *Phaeocryptopus Gaumanii* and to enter into a period of very vigorous growth, after heavy thinning.

Final yields may be very much heavier at Aughrim and other centres in Wicklow than present returns indicate. The very serious check which was experienced between the 10th and the 20th year did much to depress yields and comparison with British Forestry Commission yield tables would be likely to show that Wicklow stands in a very unfavourable light. It is interesting to note, however, that American and Continental tables for Douglas Fir give yields comparable with those recorded here.

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NURSERY MECHANIZATION

By M. E. McNULTY.

NURSERY foresters are continually worried about costs and endeavour to try out new ideas to keep them at a low level, whilst at the same time ensuring that the full annual programme is completed.

This controlling of costs is not at all easy when one remembers that present day wages and overheads are approximately three times the pre-war figure, while at the same time it cannot be said that the output by the Nursery Staff has kept pace with the increased expenditure.

To keep costs, therefore, within the limits of proper nursery economics, it is essential that manual effort be supplemented by as much mechanization as possible.

Nursery foresters may be interested in our efforts at Tair Onen, towards that end, for the past few years.

Tair Onen Nursery was started in 1936 and may now be considered in the established category with all its attendant ills—over-production due to necessity in its early years with consequent lowering of natural fertility and high incidence of weed attack.

Our main worry was the high cost of weeding broadcast seed beds which reached its peak in 1946. As well as the cost of weeding, at least 10% of the first year's seedlings were lost mainly through faulty weeding by inexperienced labour. When one considers that our weeding areas in an average year amount to about 60 acres including lines and seedbeds, one may appreciate our problem.

To meet the situation, the "Macslat" Multiple Seedsowing Drill was evolved. It is worked on the endless belt system with a density control, sows eight drills longitudinally, the drills being 4 inches apart. The machine opens the drills, sows the seed and covers with grit in one operation, though the grit covering part requires further development.

The 1946 model had a wooden hopper mounted on tyre-less cycle wheels, the endless belts being provided from an old inner tube of a lorry. The principle of its working was satisfactory.

The 1948 model is an improvement on our first effort. It is a compact, all-steel unit mounted on pneumatic tyred wheels, having its endless belt specially made. The machine at present is manually operated. It is visualized that a later model may be power driven with other refinements. The present machine cost approximately £55. Theoretically, drills take up three times the area of broadcasting, but in this instance, it was decided to drill at broadcasting density; species coming out as 1 + 0 would not hurt, whilst those remaining in for two years had a proportion pricked out at the end of the first year and bedded out leaving a number in for two years corresponding to that of drilling density.

In practice the following comparisons stood out this year. 4 lb. of S.S. were sown in each case, same identity.

	Drills	Broadcast
Density of sowing	55 sq. yds. per lb.	55
No. of seedlings per lb. at stock-taking.	13,500	3,540
Cost of sowing per lb. Prep. bed	45/-	45/-
	per 100 sq. yds.	
Sow seed	2d. per lb.	5d.
Quantity of grit per 100 sq. yds.	4 cwt.	16 cwt.
Cost of grit per 100 sq. yds.	4/8	18/5
Cost of covering 100 sq. yds.	2/9	2/9

Weeding

	Hoe twice	Weed twice
Number of times during season	Weed twice	
Cost of weeding per 100 sq. yds.	89/5	170/10
Cost per 1,000 seedlings	5/8	40/3

The following general results were found this year, taking in all species, some of very poor germination.

	Drills	Broadcast
Area drilled	27,868 sq. yds.	Area broadcast 6,350 sq. yds.
lbs. sown	416	lbs. sown 94.8
Yield	5,320 thousands	Yield 889.25 thousands
Yield per lb.	12,788	Yield per lb. 9,380
Yield per sq. yd.	191	Yield per sq. yd. 140

General Observations.

Manual weeding of drilled beds is only one-fifth that of broadcast. Hoeing can be carried out on the other 4/5. A seven-pronged two-inch spud multiple hoe was evolved complementary to the seed sowing machine. Two men hoe eight drills simultaneously and cover 2,400 sq. yards in one day.

It was noticed that seedlings in drills grew to a greater height the first year than those in broadcast beds. The constant hoeing gives better moisture retention. It is not suggested that drilling is necessary for all nurseries. Obviously in newly-started nurseries where there is no weed growth for the first few seasons, broadcasting is easier.

Readers of the Quarterly Journal of the Royal Forestry Society of England and Wales will have noticed an article in the October 1949 issue by Mr. W. E. Hiley on his observations on Nursery Machinery and Methods, from a recent visit to Western American Nurseries. He describes similar machines as those developed at Tair Onen for drill sowing of seed, except that the American product is tractor pulled.

It shows that other up-to-date countries are fully alive to the potentialities of Nursery Mechanization as a contribution to lower costs.

THE PLACE OF FORESTRY IN THE NATIONAL LIFE

(Report of symposium held on the occasion of the Ninth Annual General Meeting of the Society of Irish Foresters).

Mr. Mooney.

MR. MOONEY, forestry officer, was the first speaker and mooted the idea of the communal forest. We had seen, he said, over the past few years a great revival of interest in afforestation in this country. At the top level we had the announced policy of the Government to step up the annual planting programme to 25,000 acres with an ultimate target of over one million acres of plantations. As well as our own Society we had such groups as the Trees for Ireland Committee, the Roadside Tree Association, *Macra na Feirme* and others all doing their share in encouraging tree-planting. The newspapers too had given forestry more than its usual share of publicity, and had, without exception, supported and recommended to their readers the great idea of forestry and urged its adoption on a far greater scale than at present.

Encouraged by this awakening of interest, he was going to suggest yet another means of getting trees planted. The idea he was about to offer, the communal forest, was by no means a new one and has been well known in Europe for hundreds of years. It is the forest that is owned by the *commune* or local administrative body as distinct from either the State-owned or privately-owned forest. Before the last war Germany had 4,857,500 acres of such forest, which represents 15.5% of her total forest area. In France too, the communal forest is a strong part of the forestry system and in most European countries the communal forest system exists. The usual area of these forests ranges from 200 to 1,300 acres and they are managed by qualified foresters generally under the 'remote control' of the State forest service.

We have all seen, he said, in our wanderings through the country the rocky valley with its steep slopes covered with bracken and gorse, the old woodland site now a tangled mass of briar and thicket scrub vegetation, the higher heather-clad slopes—all productive forest lands but at present not contributing one penny to the country's economy and seemingly fated to remain in untouched unproductivity to the end of time. These small areas of waste ground which vary from one to fifty acres in extent are general and will be found scattered over every county but they are particularly noticeable in Wicklow, Tipperary, Cork, Kerry, Clare and Donegal. They can rarely be handled by the State forestry service, being too small and scattered for economic management by a service constituted to deal with blocks of thousands of acres. The farmers on whose holdings they occur may sometimes have the urge to plant them but lack the means to do so. Generally, however, both the urge to plant and the means to do so are lacking. Consequently

(iii) The powers of County Councils under the Agricultural Act of 1931 are more closely allied to forestry of a commercial or semi-commercial nature. Under this Act the County Council is required to provide a minimum sum out of its rates [at least two pence in the pound] to its County Committee of Agriculture to be applied to its agricultural and allied schemes in addition the Council may strike a special rate of $\frac{1}{2}$ d. in the £ reserved particularly to forestry. Much good work has been done under this Act but the schemes have all aimed at aiding the individual to help himself and this aid has had to be restricted so that the limited sum available could be made to meet the needs of all who wished to avail of the scheme. The County Committee of Agriculture is a body principally concerned with technical advice and it has not either the resources or the powers to undertake the work itself. Its efforts at encouraging afforestation are usually confined to the provision of a limited number of transplants at reduced prices.

Local authorities also provide scholarships which can be availed of in forestry at the National University but that so few avail of them for this subject shows the need for education in both national and secondary schools of necessity for and importance of afforestation.

The combined contribution of Local Bodies to forestry under the above heads seldom cost more than one or at most two pence in the £ on the Rates but a scheme as envisaged by Mr. Mooney would cost up to 1/- in the £. This he said was not to be taken as a criticism of Mr. Mooney's proposals but rather to show that they represented a fundamental departure from present practice and a bold solution for an important national problem, the planting of relatively small pieces of lands unsuited for other purposes. The scheme had the further merit—and in this it was almost unique in proposals normally made to Local Authorities—in that all expenditure would in a short time yield a substantial income and return for the capital invested, not merely in shelter or amenity or other intangible form, but in hard cash.

That a scheme such as that envisaged by Mr. Mooney was not beyond the scope or capabilities of Local Authorities is adequately illustrated by the success they have achieved in such diverse schemes as housing, turf production, drainage, road making, etc. It was impossible at the moment to foresee and discuss in detail all the difficulties likely to arise and the many questions raised by the proposal but he thought that as a scheme it undoubtedly was worthy of very serious consideration and publicity.

In the past two years, he said, some £2,000,000 had been spent on minor drainage schemes and we should remember that the American money so used was repayable over 35 years at $2\frac{1}{2}\%$ interest. If we could afford such expenditure then the sum of £16,000 per county on a forestry scheme seemed quite feasible, but public opinion would have to make the decision. He felt, however, that any approach to grant the

necessary powers to spend their own money on establishing their own forests would be welcomed by local authorities.

He suggested that a forestry scheme could be run in conjunction with drainage schemes, while the nursery problem might be tackled by the Vocational Schools. It would be necessary however, to educate and foster a spirit of forest consciousness in the public before such a scheme could hope to succeed.

Mr. Litton.

The next speaker, Mr. Litton, gave his views as a farmer on the position of forestry in the national life. Farming and trees, he said, had much in common, but he would not agree with forestry experts dictating to the farmer, who really knew his own business best. He had seen a slogan that the "onus of tree planting lies with the farmer" but he did not take that seriously as he believed it was put out by nurserymen. He had also heard that trees would improve the climate but he considered that the climate did not need improving: we had, he thought, one of the best climates in the world. Again he had heard that trees beautify the countryside and induce more tourists to come here, but this he called a fantastic idea. If it was going to draw more tourists he certainly did not want it. There was nothing more distressing to him than gates left open, crops ruined, and plantations burned by careless tourists brought here because we had beautified the countryside. Trees for shelter were, he said, the farmer's own business and the farmer was the best judge of whether such shelter was necessary and where to put it.

From the farmer's point of view, if forestry was going to take a place in the national life it must be as a commercial proposition. He thought Mr. Mooney's scheme was most undesirable. It was suggested it would cost up to 1/- in the £ on the rates and this would put the farmer out of business. Farmers already paid a heavier tax than anyone else and he considered it would be unjust to increase the rates by 1/- in the £ for forestry purposes.

If you want to get the farmer interested he said you must show by more than mere figures that it will pay—figures do not cut much ice with the farmer, he will move very slowly which is really the best and only way. He was not himself convinced that the proposed scheme was a paying proposition.

We all want to see more trees to improve the country, he said, and in the national outlook it might be far better to have more trees on the marginal lands. In mountain farms they graze a few sheep or cattle on these lands and while the output is very low the forester says trees would pay better, you cannot convert the value of this land to the farmer in hard cash, it must be taken in relation to the whole farm. If you take this land away you upset his economy so you simply can't take it away—if he loses this high ground his farm goes 'flop'.

The acquisition of the rough hill grazing for forestry will need an alteration in our system of husbandry and that will need research, research in the breeding of stock, in farm management, in land utilization, in forestry and the re-education of the farmer in the new system.

Farming and forestry, he said, must go hand in hand and he considered that the ideal solution lay not in Local Administration but in attaching the forest to the farm under the farmer, with some Government controls and a Government-sponsored company to deal with utilization.

Mr. FitzPatrick.

Mr. FitzPatrick, who possessed the dual qualification of both farmer and forestry expert, dealt with the economic aspect of forestry in the national life. It was most important he said to grow just what we needed otherwise we would have a surplus of one class of material and a deficiency of another. Our former target of 600,000 acres of plantations was, he understood, based on our consumption of timber and timber products for the year 1932-33. This was a curious year on which to base our figures as it was a year of depression and our present target of 1,000,000 acres seems much nearer the mark.

There were, he said, 300,000 farms and 400,000 rural dwellings in the country and these would need 10,000,000 stakes and 1,200,000 wooden gates. These could be made to last longer by chemical preservatives but even then they will not last for ever and constant replacements are necessary. Proper preservation of such materials was as good as growing extra timber, but unfortunately there was no firm in Ireland at present to supply preserved timber to the farmer. Besides this the farmers' homes and out offices would need timber for repairs and renovations and this would take a further 2,400,000 cu. ft. of timber annually. To meet these needs and from his own experience as a farmer he was convinced that trees were absolutely invaluable on the farm.

Almost every farm, he thought, had a bit of waste ground which could be planted and most farmers had the spare time to do the planting. Unfortunately they were accustomed to crops ripening in 5 to 6 months and the shift to a ripening period of 30 to 50 years was a big jerk to them. Fencing, particularly rabbit fencing, was another bugbear, and an expensive one.

While he knew from experience that it was difficult to grow trees on the farm, it was by no means impossible. The main thing, of course, was to grow the type of material required. There was a growing demand for small-sized stuff for stakes and fencing materials and for processing into pulp and fibre, etc. Rural electrification would take one-and-a-half million transmission poles and these again would require constant replacements. *Pinus contorta* had been found suitable for transmission poles in America and he would suggest that P.C. might

be planted on better land than was customary at present, for a quick return.

One of the merits of Mr. Mooney's scheme was the provision of a constant and assured supply of timber for small local industries. At present it was possible for an outside firm or individual to buy up an entire wood and so deprive the small local industry of its raw material. When a wood is cut down and exploited it is gone for ever for that generation. The small industry while dependent on the local wood seldom had the capital to buy it outright and preserve it for their own needs.

The speaker said he favoured Mr. Mooney's scheme and he thought farmers would do their part if encouraged. The whole question of species to plant, and size of materials to produce would need expert examination and the farmer would need constant advice on what to plant, when to fell, the best way to market the produce. He envisaged a scheme with a forestry expert in every county who in addition to looking after the County Council forestry scheme would advise parish councils and individual farmers on all matter pertaining to forestry.

A general debate followed to which the following members contributed :

Mr. T. McCarty, who said that from his experience the farmers had very little interest in forestry and even this little was only maintained for a short time. He got his plants at approximately half market price from the County Council and he also got a grant from the Government for planting but he neglected after-care needed to produce good plantations. He agreed with the County Council forestry scheme as practised at present in Kildare (for which County he was forester) and gave figures to show it was a sound commercial proposition. He suggested that a start could be made on a smaller scale than that proposed by Mr. Mooney and said it would not cost anything like 1/- in the £ on the rates. At present, he said, the rates paid for our agricultural, our horticultural and our poultry schemes so why not for our forestry scheme as well?

Mr. Galvin said that the Kildare scheme was not worked on the lines of Mr. Mooney's proposal. He pointed out that land tenure on the Continent was different to here and he thought that pride of ownership would be a big obstacle to communal forestry here.

Forestry, he said, was a highly technical and extremely critical science and outside the scope of County Councils and County Managers who were in any event already overburdened. He also thought that the present County Council schemes were adequate if fully availed of. He would not agree with Vocational Schools handling the forest nurseries as nursery technique requires more skill and attention than Vocational Schools could give it and he thought the nurseries could safely be left to private enterprise.

Mr. Mangan said there was a lack of pioneer spirit among farmers. We had yet to sell the idea of forestry to the farmer and while it was going to be difficult it was not impossible. The E.S.B. rural electrification scheme had made a provisional estimate of one million transmission poles for their requirements over the first ten years, but in actual fact they had only used between 40,000 and 50,000 poles a year to date. They were, he said, going to test poles of native *Thuya Plicata*, Corsican Pine and Sitka Spruce for their suitability as transmission poles but he was very doubtful if *Pinus Contorta* would be suitable. In the first place it was very difficult to get a straight stem of P.C. of suitable dimensions and secondly the absorption of cresote by P.C. was very high and could be as much as 25 lbs. per cubic foot which would make the prepared P.C. poles as dear as poles of other species.

Mr. Bogue said that in many instances the sites of roadside belts and screens had been very badly chosen. They had been put under telegraph and power lines and in due course it was found necessary to prune them. Even this operation is only too frequently badly carried out and the trees were mutilated and disfigured. This was certainly no encouragement to the farmer to plant for himself and a little more care in the planning and subsequent treatment of their screens and shelter belts by Local Authorities was indicated.

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ABSTRACT

PROBLEMS IN TREE NUTRITION

M. C. Rayner and W. Neilson-Jones.

Faber & Faber. 12/6.

The pioneer work in afforesting poor soils has met with some inexplicable failures, instances occurring where, under normal cultural methods, even the least exacting of conifers either failed to grow or gave inconsistent results.

To the late Dr. Rayner in particular must go much of the credit for the knowledge now available on tree nutrition and fertility in difficult moorland soils, and it is impossible to read this book without paying a tribute to her devotion to this hitherto unexplored aspect of afforestation.

In 1932 work on an elaborate research programme sponsored by the Forestry Commission was started by the authors on the dismal moorlands of Wareham Heath in the south of England, and the results of their investigations over many years are recorded in full in this book.

Prior to the carrying out of this research it was generally agreed that mineral deficiencies were not the only limiting factors in nutrition but no information was available to substantiate or refute any of the various biological theories which had arisen. It was suggested that in the process of humus decomposition in these organic soils various substances directly inimical to growth were produced but these were neither identified nor even proven to exist.

The authors have shown that toxic substances are present, that they are of biological origin and that they operate directly by inhibiting fungal growth. These react on the trees, it is believed, by restricting root growth, impeding mycorrhizal formation and generally curtailing the supply of nutrients normally rendered available as a result of fungal activity. An indirect result is the accumulation of raw humus with a high C.N. ratio.

On Wareham Heath Dr. Rayner applied organic compounds that brought about remarkable improvements in plant growth. The improvement was believed to be complex in origin, and highly specialised and intensive research by a team of ecologists, botanists and plant physiologists was undertaken towards obtaining evidence on which the above conclusions are based. Dr. Rayner believed that the quality of the organic substrate in the natural soil was of primary importance and thus the necessity of bringing about a change in the biological activity was apparent to her. It was found that composts removed toxic substances permanently as no other means could, and brought an end to their further production. They operate by modifying the activities of the micro-flora already present, as proved by the enormously accelerated rate of cellulose breakdown etc. Evidence is provided that the basis for these changes lies in the organic constituents of the compost rather than in the inorganic (mineral) nutrients it contains.

The effect of composts on growth of various species of pines is partly attributed to the establishment of mycorrhizal associations with possibly an indirect action through stimulation of soil fungi in general.

Beneficial root fungi are normally present in the soil though often in a dormant state from which they can be released by composts which stimulate short root growth and production of mycorrhizae. Initial growth of short roots may be due to the production of growth promoting substances as a result of the vigorous fungal metabolism.

In the course of the investigations many species and forms of root fungi were identified, some for the first time in these islands. The organisms responsible for the production of toxic substances are, however, still unidentified but a technique of biological analysis was developed that makes it possible to estimate the relative degree of toxicity in any given soil sample. The use of this technique has shown that toxicity occurs in several soils other than Wareham and it is recommended in solving practical problems of afforestation.

In conclusion the authors discuss the bearing of these results on the practical control of fertility and plant nutrients. The importance of differential biological activity in a natural soil is emphasised. Qualitative difference in the resultant products may be determined by the action of varying local conditions on these activities at any stage and fertility depends on the maintenance of correct biological balance. Addition of mineral nutrients, aeration of the soil by mechanical treatment etc., while effective to a degree, cannot of themselves guarantee permanent amelioration. Biological activity must be guided along certain lines, e.g. by control of the litter in the forest, selective planting etc. Where degenerative changes have progressed beyond a certain point it may be easier and quicker to initiate a change by application of suitable organic materials.

Finally in this very complex problem the conclusion is drawn that there is great need for further research.

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REVIEWS

Northern Coniferous Forest Soils.

By Olof Tamm. Translated from the Swedish by Mark L. Anderson.

Published by The Scrivener Press, Oxford. 17/6.

In his preface to this English translation of his treatise on the Forest Soils of north Sweden, the author claims that the work has not been planned as a comprehensive scientific text-book. Be that as it may, the forester who is concerned with coniferous plantation will find that virtually all the essential general aspects of his soil problems are here dealt with in an eminently readable and authoritative way. Although primarily concerned with north Swedish conditions, the book is sufficiently broad in its scope to be of immediate interest to workers in other areas.

In soil science text-books, many features of soils which are of fundamental interest in forestry are apt to be treated somewhat casually, as being but incidental to soils in general. In Professor Tamm's book the forestry interest is at all times predominant. I would cite his chapter on the mull and mor forms of humus as illustrative of the particular value to the forester of his specialised approach. In this he gives an insight to the influence of decomposition processes in the humus of the forest litter on the success or failure of natural regeneration.

There is sufficient general scientific treatment of north European soils in this book to serve the practical forester in northern latitudes as a text. Those who work in a climate which does not possess the severity of the north Swedish winter can reasonably make allowances in interpreting some of its conclusions in the light of their own working conditions.

I would mention in conclusion that Professor Tamm's reputation as a soil scientist extends considerably beyond the shores of Sweden. One need have no hesitation in accepting his views on Swedish forest soils as being based on long experience and sound judgment. The translator has produced a text which reads as fluently as an original composition.

P. H. G.

The Selection of Tree Species.

Mark L. Anderson.

Oliver and Boyd. 146 pp. 12/6.

The aim of this book can best be expressed in the words of the Author's Introduction: "to strive to provide what still seems to be lacking—some relatively objective means of distinguishing and classifying plantable site types which will serve, not only as an aid in the choice of tree species, but as a basis upon which a sound silvicultural practice can be built." That final phrase is typical of the author's outlook. He is not satisfied merely to provide us with a method of choosing a species which will produce a crop on any particular planting site but he aspires to relate his choice so closely to all the site factors that something approaching the natural ecological unit will result. Such a unit under proper management will have considerable powers

of resistance to disease and may well be capable of natural regeneration, even though the species used be exotic.

As in his previous booklet (published in 1932) Dr. Anderson relies on the ecological method of selection. He has summarised his experience in two tables based on six fertility and four moisture classes; the first table distinguishes twenty plant communities for which the second table lists suitable species in 'ready-reckoner' fashion. In addition he has included a useful section on other aids to locality assessment—data to be gleaned from existing stands or cleared woodlands, from geological and topographical maps, from general and local information etc. There is also a section which summarises for all the species in common use in afforestation valuable information under such heads as Range and Importance, Ecology, Uses of Timber, Scope for Use, and Technique. There are 21 excellent photographs to illustrate the text.

Irish foresters will note that the selections recommended are those which have been put into practice with good results in our own State forests over the past 20 years. Thanks to the implementation of Dr. Anderson's ideas, as now expressed in this book, it can be fairly claimed that Irish selections show a very sensitive response to site factors. In other respects too, particularly in the use of *Pinus contorta*, practice here has taken a distinctive and pioneer course which is likely to be followed elsewhere. A careful study of the author's remarks on tree species is strongly recommended and we would be glad to see him enlarge on these observations at some future date.

We would have wished that the author had enlarged on the descriptions of soil types corresponding to his typical plant communities using the modern descriptions of soils based on differentiation into horizons. It is felt that a systematic description of soils using macroscopic characteristics only and which could be applied without undue difficulty in the field would add considerably to the value of this work and would help the user to avoid error and to place the site in its correct class with greater certainty.

The author anticipates that some subdivision of his general vegetational types may be necessary within specific regions and this would appear to be the case at the lower end of the fertility scale for Ireland. Unfortunately our western peat types have been insufficiently studied from the aspect of pure ecology as well as from the aspects of plantability and selection, and further research and experimental plantings are indicated and may enable us to elaborate on the author's more general classification. Further research is also indicated for our limestone esker ridges and shallow soils over limestone pavement and also for our *Calluna-Molinia* community which appears to be a degradation of the *Calluna* heath type as described by him and which is not extensively developed here.

One might have expected in a work of this nature some reference to the modern technique of mechanical cultivation and manurial applica-

tions and how far they can be expected to alter permanently the essential characteristics of the site. Nevertheless this work represents the first comprehensive approach in these islands to a very intricate problem and is likely to remain for many years an invaluable aid in selection. No forester should neglect its careful and detailed study.

T. McE.

Pakistan Journal of Forestry. Vol. 1. No. 1. 7/6.

The establishment and development of the Forest Service was one of the great achievements of British Rule in India. When the final break came that sub-continent had a sound forest policy enshrined in legislation and implemented by a personnel of the highest standing. Partition and the formation of the new state of Pakistan gave rise to many problems not the least of which was the organisation of a forest service under the most difficult circumstances. The far-famed Training and Research Institute at Dehra Dun went to India and Pakistan was left with no training centre, no place for research no decent library and, perhaps the most severe hardship of all, a service sadly depleted in senior staff and specialists. In view of this combination of adverse conditions, we must congratulate Pakistan on the establishment so soon of a technical journal and we must also record our pleasure at the progress in organisation recorded therein.

The first number runs to 94 pages and contains ten original articles besides abstracts, reviews and letters—a very creditable achievement. The article of most general interest is contributed by the Editor, S. A. A. Anvery and treats of Forest and Forestry Problems of Pakistan. The two wings of Pakistan are 1,500 miles apart and there is a corresponding divergence in climate, vegetation and forest problems, conditions varying from the arid, practically rainless expanses of Baluchistan to the extremely wet areas of East Pakistan with a rainfall of over 200 inches. The nominal forest area of over 83 million acres represents 5.33% of the land surface but many areas designated as forest are in fact treeless. This small proportion of forest is largely due to incidence of population. Due to the almost complete lack of alternative fuels, firewood is of even greater importance than commercial timber and fetches a price in excess of that of wheat in pre-1942 years. Partition has left the country without a paper industry and it is planned to start two big mills in either wing. To make for closer utilisation of all the products of the forests it is proposed to establish an integrated industry or 'combine' to produce timber, paper, matches, plywood, fibre board, gums, resins, oils, chemicals, etc. Courses for the training of professional and sub-professional ranks have been instituted at Upper Topa in the Punjab.

Altogether this Journal gives the impression of a service severely handicapped, but undismayed by political events, facing the future with initiative and enthusiasm. We wish it good luck and God speed.

SEVENTH ANNUAL EXCURSION

Report by M. SWAN, B.AGR.SC.

THE Society's 7th Annual Excursion was held on the 23rd, 24th and 25th May, 1950, to the Wicklow district and we had the pleasure of having as guests some of our Welsh hosts of the previous year. Those who made the trip from Wales were Mr. F. C. Best, conservator for North Wales, Mr. and Mrs. Harrison, Messrs. A. J. Davies, R. W. Waters, L. E. Hughes and J. Morris. This was probably the most successful excursion we have yet had, it certainly was the best attended, over 80 members and their friends attending each day, and many lively and interesting discussions arose. The party was based in Dublin and travelled each day by bus and car.

First Day, 23rd May.

The excursion opened with a visit to Ballintombay property of Rathdrum forest. On assembly at this property Mr. Meldrum, on behalf of the Minister for Lands, welcomed the party, while Mr. McEvoy, our President, extended a particular welcome to our Welsh friends. The Convener, Mr. O. V. Mooney, then gave a brief history of Forestry in Ireland.

Up to the beginning of the 18th century the history of Irish forests is almost entirely one of exploitation. About that time, however, the landlords began planting on their estates and their interest lasted for almost a century-and-a-half. With the decline of the large land-owner constructive forestry in general and planting in particular was abandoned, until at the beginning of the present century the State began to take an interest in forestry. Avondale was acquired as a forest school in 1903 and the first plantations were laid down in 1905-6, but little serious progress was made until after the first World War. From 1923 to 1932 progress was steady but slow approximately 3,000 acres being planted each year. In 1932 a fresh impetus was given to forestry and by 1939 almost 73,000 acres of State owned plantations had been laid down. The second World War then slowed down progress for a number of years but in 1950 with the planting of 8,000 acres the total of State owned plantations reached 131,971 acres with a reserve of plantable land of just over 28,000 acres. At the present time a policy has been initiated to step up afforestation considerably and a 25,000 acre annual planting programme has been fixed as the first target which it is hoped to reach in 1952. An ultimate target of one million acres of plantation is being aimed at, which would represent a forest area of about 6% instead of our present figure of 1.5%.

The Convener then dealt in detail with the Wicklow district. Wicklow contains one of the biggest mountain massifs in Ireland and elevations over 2,000 feet are common. The central core and ridge of

these mountains is granite while Lower Silurian rocks outcrop on either flank and on the east extend without interruption to the sea except for a small mass of Cambrian rock which occurs between Bray and Wicklow. The influence of glaciation is apparent in its deepened valleys and in its lakes. In the mountain mass the rainfall is about 60 inches per annum and the humidity is high, with mists and fogs frequent. Towards the sea, however, the climate is comparatively dry and the rainfall of 35 inches per annum is below average for the country.

Much of the high-lying ground in this district is very suitable for forestry, protection from the prevailing south-west wind—always a foremost consideration in forestry in this country—being afforded by the high-lying ridges of the massif. The total area of State owned plantations in this district is 24,600 acres with a reserve of plantable land of 5,600 acres. In addition an area of 210 acres is under nurseries which provide the greater part of the plant supply for the entire country.

The party, led by the Convener, then proceeded to inspect Ballintombay property. The main interest was centred in the comparative growth of *Pinus contorta*, *Pinus laricio* and *Pinus sylvestris* in juxtaposition at approximately 1,100 feet elevation on an easterly but generally exposed slope the predominant vegetation of which was strong *Calluna*. The plantations were laid down in 1926 and the *Pinus contorta* now stood at 20 to 25 feet and was still vigorous. The Corsican pine had only grown from 5 to 15 feet and was showing signs of deterioration, while the Scots pine had rarely bettered 4 feet and seemed to have gone into complete check. As the party continued its progress to 1,450 feet the *Pinus contorta* still continued vigorous and without showing any effects of the increased exposure which had then become severe. The almost complete failure of the Scots pine and to a lesser degree of the Corsican on the same ground and often in the lee of 15 ft. *Pinus contorta* stands was very striking. Mr. Best speaking in the discussion said he had never seen S.P. do so badly or P.C. do so well as here. P.C. was very little used in Wales but S.P. had been grown successfully at elevations up to 1,600 feet. Mr. Galvin suggested that the failure of the S.P. might have been due to the race of seed used and stressed the necessity for research in this direction.

Also seen during the morning's inspection was a stand of *Cupressus Macrocarpa* 22 years old at an elevation of 800 feet on a slightly exposed south-east slope. The soil was a light shaley loam and at the time of planting the site was a grass field in the early stages of reversion to *Calluna*. This stand the Convener said was probably the best of C.M. in the country in point of form and quality, while measurements showed a mean annual increment of 112 cubic feet per acre. Mr. Forbes remarked that C.M. will not clean itself and has to be pruned, but that its timber was the most durable we could grow.

In the afternoon the party visited Avondale Forester School and Forest. The Superintendent, Mr. T. O'Carroll, speaking first in Irish and Welsh and then in English welcomed the party to what may be termed the cradle of Irish State forestry and gave a brief outline of its history. From him we learned that Avondale House was built by one Samuel Hayes, who was an ardent lover of trees and the author of the first book published in Ireland on tree planting, a copy of which is kept in the School library. On his death the house and estate passed to Sir John Parnell, then Chancellor of the Irish Exchequer. Eventually it passed to Charles Stewart Parnell, leader of the Irish Parliamentary Party in Gladstone's Parliament. On his death the estate was sold to a Mr. Boylan of Dublin who in turn sold it in 1903 to the Dept. of Agriculture and Technical Instruction for Ireland for forestry purposes. It then became the State Forester School and most present day foresters in Ireland have received their training here. Here also in 1905-6 were laid down the first State-owned plantations, mainly in the form of one acre experimental plots of a wide range of conifers and hardwoods, pure and in mixture. Much that has been learned at this centre has been applied in practice throughout the country.

Very full descriptions of the plantations at Avondale will be found in Vol. III No. 2 and in Vol. VII Nos. 1 and 2 under the reports by Messrs. Maher and Deasy of previous visits to this centre. Only one or two of the outstanding plots therefore need mention here.

One of the most important factors influencing the early development of the experimental plots was spring frosts. Records show that much damage was caused in 1907, 1909, 1911 and 1914. The greatest damage however was in 1911 when the frost occurred as late as 15th June and it took the damaged plants several years to recover from its effects. In the case of *Abies pectinata* many plants were killed outright and the effect on the remainder was permanent resulting in the almost complete failure of this species. The effects on the subsequent development of D.F. and Ash were also very pronounced while other Silver Firs, Spanish Chestnut, Oak and S.S. suffered to a less extent.

Another important factor was the irregularity of thinning and attention generally. During and immediately after the First World War it was not found possible to devote the necessary attention to the plots and this neglect at a critical stage unfortunately upset the basic object of many of the experiments by allowing nurse species to dominate and suppress main crop species. Indeed when treatment did become possible it was often too late and the nurses had to be accepted as final crop trees. The history of the S.S./J.L. plot in this respect was of particular interest and showed the wonderful recuperative powers of S.S. The original mixture of this plot was S.S./J.L. 50/50 planted at four foot spacing. The spruce suffered severely from successive spring frosts and from *Aphis* attacks so that the J.L. outgrew and proceeded to suppress it. In 1927 it was concluded that the S.S. was past recovery many of them being mere bushes. However some tentative thinning

and pruning of the J.L. was carried out and quite surprisingly the S.S. responded at once and in two or three years the apparently doomed S.S. were developing leading shoots of 2 to 3 feet. This spruce is now 82 feet high with an average Q.G.B.H. of 10 inches and a mean annual increment of 109 cu. ft. U.B. per acre for the plot.

The most outstanding plot seen was of course that of *Abies grandis*. This one acre plot was planted with *Abies grandis*/*Abies pectinata* 25/75 mixture. The latter species originally intended as a nurse was severely damaged by frost and eventually suppressed by the A.G. Records to date show a total production of 16,268 cu. ft. U.B. from this plot, which gives a mean annual increment of 361 cu. ft. U.B. per acre. Mr. Best remarked that in Wales they find *Abies Nobilis* superior to A.G. in the hills but that A.G. is the better in the lowlands. Nowhere, he said, had he seen anything at all comparable with the Avondale plot. Mr. Mooney pointed out that the yield, exceptional as it was, would probably have been much greater if proper attention could have been paid to thinning during the first 30 years or so. Mr. Clear, in a discussion on the present treatment of the stand, suggested further thinning as the trees were still vigorous and he hoped for natural regeneration.

Second Day, 24th May.

On the morning of the second day the party assembled at Glendalough for an inspection of part of that forest. Glendalough is famous both for its natural grandeur and for its monastery founded by St. Kevin in the 6th century. Despite plundering and pillaging by Danes and Anglo-Normans this monastery continued until 1398 when it was finally destroyed and deserted. It was a monastic settlement complete with churches, stone bee-hive cells, round tower, workshops, mill, dairy etc and was only at the beginning of its fame when St. Kevin died in 618 A.D. Practically the only ruins now remaining are those of the Churches which has caused Glendalough to be sometimes called the Valley of the Seven Churches. In 1876 however the foundations of an 8th Church were discovered and it is now generally believed that there was also a ninth Church the site of which has yet to be discovered.

The area chosen for inspection was Lugduff property which lies on the south side of the lakes, the elevation being from 440 ft. at the lake side to 2,179 ft. at Mullacor one-and-a-half miles to the south. The underlying rocks throughout are of Upper Silurian origin mica-schist being the usual derivative. Below the 1,100 ft. contour light shaley loams are met with and are very suitable for tree-growth. Above this contour however the rainfall averages over 60 ins., atmospheric conditions are very humid and peat is general. The influence of glacial action is very striking at Glendalough, the valley bottom was gouged out and both lakes owe their origin to the ice, the moraine being very evident across the valley near the round tower.

The party began the ascent of Lugduff property on the new road constructed during the war years to give access to the upper areas for the extraction of thinnings, etc. Mr. Maher pointed out some of the difficulties met with in the construction of this road, the very steep gradients, the difficult bends and the embankments and bridges necessary, and how by careful planning they had been surmounted. He referred in detail to the question of capillary water and how best to deal with it.

A stop was made in a D.F. plantation 28 years old and situated on a sheltered S/E slope at 800 ft. elevation. The soil was a deep fertile shaley loam with a high degree of moisture and was, before planting, a grass field near the houses of a mountain farm and in good heart. The crop now had an average height of 46 ft. and a Q.G.B.H. of $5\frac{1}{2}$ ins. while the yield was just 2,000 cu. ft. U.B. per acre. The general comment of the party expressed by Mr. Harrison was that the stand had been left too long before thinning. Mr. Best suggested fairly heavy and frequent thinning for D.F. as the canopy closes quickly and stressed the necessity for starting early. Mr. Clear said that from stem analysis he had noticed that suppression in D.F. began at about 13 years for 6 ft. \times 6 ft. planting and consequently early thinning was essential. He suggested a thinning cycle of 3 years. He also referred to the very fine natural regeneration of D.F. at Lough Gill forest seen during our excursion to the Sligo district.

The party then passed through a stand of E.L./J.L. planted in 1922 and showing very clearly the lack of success that is experienced with E.L. at high elevations in this region. The ground was of very good quality with grass and bramble predominant in the vegetation and while the J.L. had done well the E.L., 28 years old was very poor indeed.

In contrast to what we had seen on the first day at Ballintombay we found here at Lugduff a promising stand of S.P. at 1,100 ft. elevation. This crop was on a steep southern slope and in an exposed situation, soil and drainage conditions however were excellent.

From a natural grandstand, overlooking the lakes we had a wonderful view of this historic beauty spot and Mr. McEvoy described the vegetation of the district in general and gave an account of the old system of farming, "boleying", practised in these regions by which the farmer drove his flocks to the high hills and set up house there during the summer returning to the lowland enclosures for the winter.

On returning to the natural oak-wood on the lake shore Mr. McEvoy gave a short lecture on Our Natural Sessile Oak-woods, after which the party adjourned for a picnic lunch on the lake-shore.

After lunch the party travelled to Glenmalure forest which with an area of 6,478 acres has the distinction of being the largest forest centre in the country. It also has the distinction of having our highest-lying plantation as in it we find a stand of fairly good S.S. at approximately 1,750 ft. elevation. Road construction is at present the biggest operation at this centre and thinning (which is the most important work)

has been dependent to a great extent on its progress. As the labour supply is not sufficient to cope with both operations together the question of whether in the interests of economics thinning and road construction should proceed together or in the interests of silviculture thinning should take precedence was debated with the honours about even.

Glenmalure is a narrow steep-sided valley of glacial origin. Elevation ranges from 400 ft. to over 3,000 ft. On the south and west the rock formation is mainly granite while mica-schists with quartzite intrusions occupy most of the north and east.

The party first inspected the new road being constructed at Ballyboy property and Mr. Maher pointed out how the lesson learned at Glendalough had been applied here. Of particular interest was a recently constructed river ford. The stones, Mr. Maher told us, should for the best and most lasting results be placed vertically and not horizontally as might at first be expected. He stressed the necessity for beginning construction in the centre of the stream and working towards either side to ensure that every stone is locked in position.

The species mainly used in Glenmalure were S.S. D.F. and larches with S.P. and P.C. The S.S. has been greatly retarded by continued severe frosting during its early life but it has now come through and a first quality crop has in many cases been established. A short stop was made in an S.S. stand in Compartment 35 which carried over 4,000 cu. ft. U.B. per acre at 26 years of age.

Next came a stand of D.F./J.L. originally planted in 50/50 mixture at 6 ft. \times 6 ft. Unfortunately the J.L. had been allowed to dominate and suppress the D.F. and will now have to be accepted as the main crop species. Mr. Clear doubted the advisability of a D.F./J.L. mixture. He considered it a particularly doubtful mixture in areas like Glenmalure where the necessary labour was not available for cleaning and thinning at the critical time and unlike S.S. D.F. will not recover from suppression. That D.F. when planted pure was capable of quite good yields in this area however was seen during the afternoon ramble.

Continuing the ascent the party again noticed the failure of S.P. on the 1,000 ft. contour. The area was originally planted with E.L./S.P. 50/50 mixture in 1923 but was cleared in 1949 only a few of the best S.P. being retained and the area replanted with S.S. The situation is exposed with south-west aspect but soil conditions are good and moist. The S.S. is now doing quite well and the main problem now is deer and weevil damage.

Before beginning the descent to the cars the party scrambled out on to the noted Michael Dwyer Rock overlooking the historic glen and Mr. Maher gave us an account of Glenmalure, its history, and its association with the O'Byrnes and the O'Tooles, and in more recent times of its part in the Rising of 1798 and of Michael Dwyer.

In the descent the party passed through some stands of D.F. planted pure at 6 ft. \times 6 ft. in 1926. They were on a steep south-east slope in an exposed situation but with a deep well-drained soil and were quite promising. The average volume per acre under bark was 1,350 cu. ft. while the average tree had a total height of 37 ft. with a timber height of 24 ft. and a mid quarter girth of $3\frac{1}{2}$ inches.

Before dispersal the party inspected a timber-chute for extraction of material from the difficult and inaccessible upper slopes of the glen.

On Wednesday night the Society entertained our Welsh guests and all those associated with the excursion to dinner in the Dept. of Lands Luncheon Club, Upper Merrion Street. The Minister for Lands was unfortunately unable to attend but was represented by Mr. Nally, Secretary of the Dept.

Third Day, Tuesday, 25th May.

The third and last day of the excursion was spent at Aughrim Forest. This forest comprises some 2,835 acres and the early plantings date from 1922. It is made up of a number of scattered properties around Aughrim village together with some larger and more compact mountain areas which stretch for some seven miles along the eastern side of the Ow River valley. Ballinglen Forest, some 2,900 acres in extent, lies on the western side of the Ow valley and was once part of Aughrim Forest.

As at Glenmalure and Glendalough glacial action has greatly influenced the topography of the Ow valley. Silurian rock again is met with mostly but outcrops of granite and Cambrian rock are not infrequent. A wide variety of site-qualities is met with in this forest ranging from rich sheltered old woodland sites at 150 ft. elevation to difficult calluna-molinia peat types at 1,500 ft.

An annual planting programme of over 100 acres has been maintained at this centre over recent years but at present the most important operation is thinning. Road construction has as far as possible kept pace with thinning and a small portable mill has been operated for the conversion of the thinnings into boxwood, pitwood, fencing materials, etc.

A nursery of some 19 acres is maintained at this forest and was among the first areas visited for the day. Mr. Ryan said that this nursery has been in continuous use for the past 30 years and that it had now been decided to rest it. Consequently it now had only a small area under seed beds, the remainder being under green crop. The soil was light and friable and easily worked and produced good S.S. transplants. Until recently, he said, most of our nursery areas had been concentrated in Wicklow but now we were going further afield and nursery ground was being acquired in all areas where there existed large tracts of potential forest lands, as shown by the recently completed Survey of Plantable Land. He also pointed out that as a direct result of our visit

to Wales the previous year a heath-land nursery was now being established.

The first plantation visited was a mixed D.F./J.L. 50/50 mixture planted in 1923. The site was an old oak woodland with a deep well-drained soil of Silurian origin and the area was sheltered. Unfortunately the first thinning was not until 1945 with the result that the J.L. had suppressed the D.F. and was now the main crop. Mr. Harrison agreed with the thinning as it had been carried out, while Mr. Morehead suggested that a much heavier thinning over a small area might be carried out as an experiment.

Among other plots seen was one of *Abies Grandis*/J.L. planted in 1923 at 6 ft. \times 6 ft. This was also on an old oak woodland area with a deep well-drained soil of Silurian origin. The elevation was about 400 ft. and the aspect southern but the area was not exposed. The stand was not thinned until 1947 and at the time of our visit was marked for a further thinning. The *Abies Grandis* was deliberately favoured in thinning and now completely predominates and is very vigorous with a current shoot-growth of over two feet. The average tree had a total height of 65 feet with a timber height to 3 inches of 47 ft. while the Q.G. at B.H. was 7 inches. The stems were well formed with little taper and the Q.G. at half timber height was 6 inches. The larch on the other hand had a timber height of only 34 ft. and a B.H.Q.G. of $5\frac{1}{2}$ inches. The A.G. had a volume of 4,440 cu. ft. per acre while the J.L. had only 200 cu. ft. per acre giving a total of 4,640 cu. ft. per acre for the plot.

The party then visited a series of D.F. plots at Roddenagh and Killaduff. A comprehensive survey and assessment of these areas had been carried out by Mr. Clear and detailed figures were available to the party for the stands visited. An account of this survey in relation to D.F. and the lessons to be learned from it has been contributed by the assessor, Mr. Clear, and appears in this issue.

At the conclusion of the excursion Mr. McEvoy thanked the Minister for Lands and his staff for the facilities accorded the Society and for the careful and painstaking arrangements they had made.

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Excursion to Killakee Forest

Report by D. M. O'SULLIVAN.

AN excursion to Killakee Forest was held on the afternoon of July 8th, 1950. This Forest is on the Dublin foothills about 3 miles from Rathfarnham and the soil is of granite origin. The weather conditions were ideal and a large party attended.

At the outset Mr. Swan (Convener) welcomed the party on behalf of the Minister for Lands. He then gave details of the progress of the forest to date. The party was then conducted to what might be termed the Pinetum of the forest. Here in picturesque surroundings were to be found tree species from four continents and an interesting discourse on the characteristics of each of the species in view was given by the Convenor.

The party then proceeded to a pure ash plantation on an area which was surrounded by a mature hardwood belt. The planting was carried out in 1938 and the spacing was 4' \times 4'. The vegetation on half of the area was meadow grasses, while nettles predominated on the other half. The trees on the latter area got away rapidly while those on the ground carrying the mat of grass were very slow in the early stages and at present (1950) there would be the equivalent of 4 years difference as regards rate of growth. In 1944 half of the hardwood belt on the side nearest the ash was removed as the ash was inclined to lean away from the belt due to excess shade. The area where nettles predominated at time of planting got a weeding in the summer of 1946. In this operation the rough and badly-shaped stems, mostly wolves were removed. Subsequent thinnings were carried out in 1947 and 1948 when the number of stems was reduced to eight hundred per acre. At this stage *Tsuga Heterophylla* and *Thuja Plicata* were introduced as an under storey. The average height of this area is 23 ft. and the average Q.G.B.H. is 3¼ ins. The area carrying grasses at time of planting had not got any treatment other than pruning of double leaders as it had not yet reached the weeding stage. The party agreed that this was a fine stand of ash both as regards rate of growth and immunity from disease. Mr. Clear was of the opinion that it may have been the leaf-fall from the surrounding belt that was responsible for so marked a difference in the rate of growth and that the removal of the hardwood belt would be detrimental rather than beneficial to the plantation. He did not favour the introduction of the shade bearers which he feared would create undue root competition which would retard the growth of the ash. He was of the opinion that the thinning might have been more severe.

The next area visited was planted with oak, beech and horse chestnut in equal proportions. Very little of the horse chestnut remains possibly due to damage by hares which despite constant snaring are still numerous on the area. During the eight weeks blizzard of 1947 the area became infested with hares and the damage caused to the

horse chestnut was notable in comparison to that caused to the beech and the oak. The bark of the horse chestnut was completely stripped for nearly 4 feet above snow level, while the damage to the beech was slight and to the oak, negligible.

Japanese Larch except for one small area was included as a nurse through the hardwoods at 20' \times 20'. The ground vegetation at time of planting varied from cocksfoot, meadow foxtail and meadow grasses on the better and more fertile ground to crested dogstail, sweet vernal grass, creeping cinquefoil, germander speedwell and birdsfoot trefoil on the drier and less fertile ground. As regards rate of growth the oak has done better on the better type ground while there is no appreciable difference in the case of the beech. On the ground where no Japanese Larch nurses were included the hardwoods are inclined to spread and be more bushy than elsewhere. The chief disadvantage of Japanese Larch as a nurse was its rapid rate of growth and spreading habit which caused damage to the hardwoods and required pruning at an early stage. At ten years the height of the oak on the area averaged more than 4' which is the average for similar plantations grown by the British Forestry Commission. The removal of the Japanese Larch was being carried out.

An interesting discussion took place concerning the past and future treatment of the plantation. Mr. Clear was of the opinion that ploughing of the ground at time of planting would have been more satisfactory than the system adopted. This method would have obviated grass clearing which was expensive. The absence of grass caused by ploughing would have given the plants a chance to get away in the early stages. Mr. Hayes suggested topping back the Japanese Larch to half height. This would have the effect of keeping the ground clean as well as continuing to encourage cleaner and straighter hardwood stems. Mr. Ryan was of the opinion that the removal of the nurse trees should have commenced earlier.

The next stop was at an area planted pure with Spanish Chestnut at a spacing of 4' \times 4'. Though the area was small the ground varied considerably and there is a notable difference in the crop both as regards rate of growth and number of good stems. There was a gradual slope and the site quality varied from a moist loamy soil carrying cocksfoot, meadow foxtail and timothy to a lighter and less fertile soil carrying sweet vernal grass, germander speedwell, crested dogstail, birdsfoot trefoil, knapweed, etc., on the higher ground. On the better type of ground there is a smaller proportion of bushy topped stems and the average height is 14'. There is a gradual falling off in height growth to the top of the slope where the height is only about 4' and where there are few clean straight stems. A number of bushy topped trees were cut back in the spring of 1944 but unfortunately most of the resulting shoots were killed by the severe May frost of that year. A few escaped however and the advantage of cutting back was very evident.

On the last plot visited ash in the diamond-shaped beds of 13 plants, 2' apart and 25' between the groups were planted in a matrix of Lawson Cypress pure at 4' \times 4' the intention being to get one straight stem from each group of ash. The ash remained at a standstill in the early stages and looked as if it were going to be a failure. When the Lawson Cypress killed out the ground cover of grass the ash made rapid growth and now exceeds the Lawson Cypress in current height growth. The height of the ash at present is about 20'. In each group most of the ash have been removed and a few good stems left from which the one finally selected will be chosen. The Lawson Cypress crop carries a number of rough and forked trees. Both Mr. Ryan and Mr. McEvoy were of the opinion that the race of the seed was responsible. Mr. Clear while admitting that the stand did not look as one would expect, considered that with careful silvicultural treatment it should develop into a successful crop.

Excursion to Dundrum Sawmill and Forest

Report by F. G. MORIARTY.

THE Society concluded its year's outings with a very successful excursion to Dundrum Forest and Sawmills on 22nd October, 1950, the attendance exceeding 100. Mr. Haas, District Officer, welcomed the guests on behalf of the Minister for Lands and gave a résumé of the improvements carried out at the Sawmills which were now completely modernized.

Mr. Meldrum explained that, heretofore, the absence of suitable machinery prevented us from utilizing our timber produce to the best advantage, but that now, the new electrically-driven machines and the drying kilns recently installed, would enable Irish timber to compete favourably with the best imported stock.

Mr. Meldrum then conducted the party through the mill where they saw these new machines in operation. A large log of Oak was broken down on the electrically-driven Band Mill and then re-sawn into cross-arm sizes and bored to E.S.B. specification. The members next inspected the two Drying Kilns. One of these was then charged with a bogey load of Scots Pine planks and the members were shown how the process of drying was initiated. Subsequent to this the machining of kiln-dried stock into tongued and grooved flooring boards on the "five cutter" was demonstrated. The finished product was greatly

admired and all were convinced that Mr. Meldrum's statement, made at the outset "that Irish timber when subjected to proper treatment was second to none" was well and truly substantiated.

At the request of some of the members a short run was made through the Forest. We visited Gurtussa Property, a block some ninety acres in extent, comprising in the main Sitka-Spruce with some Scots Pine and European Larch and planted during the years 1911 to 1914. The members could observe here what judicious thinning and proper silvicultural methods can achieve. Some truly magnificent Sitka Spruce stems were seen in the older 1911 plantations. Of an average breast height quarter girth O.B. of 13" and standing 68 feet in height they gave promise of a high timber yield on maturity.

Mr. Haas outlined the history of the block and traced its life through the initial weeding and pruning operations and the various thinning stages, down the years, to the present date. Mr. Mooney started an interesting discussion with Mr. Clear on the Silvicultural characteristics of the stand.

We next traversed various Spruce woods more recently planted and saw how the work now being carried out was gradually bringing them into line with the one previously visited. An E. Larch stand in C. 30 aroused much interest. It was planted in 1919 and was bounded on the north north-west and south by Spruce blocks of the same age, and it was observed that considerable natural regeneration of Sitka Spruce had come in under the Larch. Wherever the Larch canopy was thin the young Spruce were doing very well. Mr. Grant, the forester, explained that a heavy thinning of Larch was intended and that then, by scarifying the ground, it was hoped to reseed the area with Sitka Spruce.

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NINTH ANNUAL GENERAL MEETING

(Report by MISS R. McDONAGH and M. SWAN).

THE Ninth Annual General Meeting of the Society was held in Jury's Hotel at 7.30 p.m. on Friday, 16th March, 1950. The President, Mr. T. McEvoy was in the chair and the large attendance filled the spacious room to capacity.

On the suggestion of the President the minutes of the previous Annual General Meeting, which had already appeared in the Journal were taken as read and were signed.

The President then called on the Secretary to read the report of the Council for 1950.

COUNCIL REPORT FOR 1950.

The first meeting of the Council was held on the 4th February, 1950. The new Council appointed sub-committees to deal with arrangements for excursions, the publication of the Journal, to look after finance and tree registration. Eleven members attended this meeting.

The second meeting of the Council was held on the 3rd May. Nine members were present. Final arrangements for the Annual Excursion were completed and a dinner in honour of the Welsh visitors was arranged.

A further meeting of the Council was held on May 24th. Six members attended. The main business was concerned with the arrangement of a programme of day excursions for the summer and autumn.

Further meetings were held on 6th September and on the 29th November. Eight members attended each of these meetings.

MEMBERSHIP.

During the year 18 Associate, 4 Grade I, and 27 Grade II members were enrolled. An analysis of the roll book shows that, with new enrolments and losses due to deaths, resignations and lapsed membership, there are now 118 Associate, 46 Grade I and 81 Grade II members.

The growth of the Society, while not as rapid as the Committee would wish to have it, is satisfactory. With the growing interest in forestry in the country a good enrolment this year is anticipated and members are urged to do their utmost to encourage new members to join. It is felt that the best way of selling the forestry idea to the country is to bring the people into direct contact with the forest through the medium of excursions, attendance at excursions is the surest sign of interest in the Society's activities.

FINANCE.

The abstract of accounts for the year 1950 could not be included with the notice of the Annual General Meeting. Owing to the Bank Strike, the Treasurer was unable to bring the accounts to audit in time. The statement is now to hand and has been circulated at this meeting.

While the statement shows the balance to our credit to be in a very healthy state, it is apparent from a close analysis of the account that current expenditure barely covers current income. We had the cost of only one issue of the Journal to meet last year. We are again indebted to Mrs. A. H. Henry for a further donation of £25 to forward the work of the Society.

JOURNAL.

One issue of the Journal appeared during the period under review. Members and others have commented on the continued high standard of the Journal and the Council is satisfied that in spite of rising costs of printing and paper the Journal should continue to be published and that at least 2 issues should appear each year. The revenue from advertising and sales is well maintained amounting this year to £30 for the one issue. As a result of the work of our Business Editor many County Libraries are now stocking our Journal and this should have the effect of bringing our Society to the notice of a much wider public as well as improving our receipts.

EXCURSION.

The excursions held during the year were very well attended. The Annual 3-Day Excursion was favoured with very good weather and there was a big turnout each day. Our Welsh guests were very pleased with their visit and indeed, their presence added enormously to the pleasure and benefit of the whole outing. The Convener, Mr. O. V. Mooney, and the officers of the Forestry Division are deserving of the highest praise for the organisation and facilities put at our disposal on this and other occasions.

The day excursions were all favoured with good weather in a year when fine days were few and far between. The areas visited were Killakee, Curracloe, Gort and Dundrum.

AUGUSTINE HENRY MEMORIAL.

On the occasion of the 8th Annual General Meeting the Council reported that with the approval of the Minister for Lands and the consent of Mrs. A. H. Henry, a Memorial Grove was to be planted at Avondale. The Council is pleased to report that the ground has been fenced and planted and that a memorial plaque is almost ready for erection. It is hoped to have the formal opening of the Memorial Grove in the early summer.

The adoption of the Council's report and the Abstract of Accounts was proposed by Mr. Chisholm who congratulated the Society on its strong financial position and on its great activity and interest during the year. Mr. Ross seconded and the meeting unanimously agreed to the motion.

THE President thanked the members for doing him the honour of re-electing him for a second term of office and then proceeded to review the past year's developments in the world of forestry as follows :—

PRESIDENT'S ADDRESS.

"Looked at in a broad general way the present international forestry situation is still to a large extent a direct result of World War II.

Apart from a few European countries like Germany, Switzerland and France where forest management has for centuries been the norm, the necessity for national forest policies came to be generally accepted only after World War I. Substantially the forest policies of such countries as U.S.A., Canada, Britain, Ireland, Australia and New Zealand date from that period. World War II, with its mass destruction of the essentials of civilized existence and the enormous post war demand for timber for reconstruction, has re-emphasised the need for scientific management of existing forests and an extension of forest areas. Most countries have therefore been having a 'check-up' and have been formulating plans for large-scale afforestation. In so doing the experience gained in the inter-war period has been of immense value and it can fairly be said that the new plans are usually based on a more realistic appreciation of the problems involved.

The first effects of these revisions of policies are now becoming evident but it is already clear that the unsettled world situation has taken its toll in so far as accomplishment falls short of target.

In Britain for example according to the latest published figures, land acquisition progress has reached only 21% of the target figure. The planting reserve of 335,000 acres, itself considered inadequate, has been eaten into. Planting reached 76% of the target.

In the older forest countries of Europe the problem is not so much one of afforestation as of making up for the war-time overcutting by reducing annual fellings to a figure equivalent to nett annual growth. It is with regret that we must record that this is not being accomplished. Even in Switzerland felling still exceeds normal growth by 22%.

The War has had one beneficial effect in stimulating the application of mechanical methods to the diverse operations of the forest. Naturally the most spectacular results have been in logging and utilization but important advances have also been made in the nursery and in the use of crawler tractors in preparing ground for planting.

You will recollect the damage done by forest fires in the Landes District of France last summer. The marketing of some 5 million cubic metres of fire-damaged timber has created havoc in the markets there. Some idea of the immensity of the problem may be gained if we remember that this quantity of timber would supply our total requirements for about six years.

Turning to the utilization side, we find that recent trends have continued. The use of solid timber continues to be restricted both

in constructional work and in furniture manufacture. On the other hand the consumption of fibre board, pulp, block board, plywood, veneers etc. is expanding rapidly. In my opinion this development should be welcomed by foresters as it increases the adaptability, versatility and competitive powers of wood in relation to other raw materials and in addition makes for economy and efficiency. In this connection it is of interest to note that the British Vampire jet fighter is constructed entirely of wood—Sitka Spruce and balsa woods.

Timber prices, which tended to fall early in 1950, began to rise in the Autumn with the outbreak of war in Korea and the trend is still sharply upward. Paper pulp in particular is rising steeply and is likely to continue for long in short supply.

We must now ask ourselves what developments of significance there were in Irish forestry during the year.

The beginning of the year saw the field work of the Survey of Plantable Land completed. The results showed that there are still some 1,200,000 acres of marginal and sub-marginal agricultural land and cleared woodland capable of growing timber crops. Adding to this figure an estimated 60,000 acres of stocked woodland in private ownership and some 170,000 acres of productive State forest lands we see that the total potential forest area is close on a million-and-a-half acres. This survey has already proved of inestimable value in providing the solid basis of fact on which the F.A.O. mission could build policy proposals and it has enabled the Forestry Division to put the planning and control of land acquisition on a sounder basis.

This brings us to the F.A.O. mission. Ireland was fortunate in securing the services of so distinguished a forester as D. Roy Cameron, Chief of the F.A.O. Forestry Group in Europe and past Director of the Dominion Forest Service of Canada. His report which has just been made public is the first formal review of our forest policy since 1908. It adopts the million acre target set by the Government in 1949. The programme is divided into two parts, commercial and social. The commercial policy of establishing half-a-million acres at an annual planting rate of 11,750 acres is designed to provide our minimum emergency requirements of 100,000 standards, equivalent to half the estimated maximum future consumption. This part of the programme would be concentrated in aggregations of not less than 3,000 acres on the more fertile forest soils.

The other half-million acres of what Mr. Cameron terms 'social forestry' would be on the poorer soils which occur mainly in the west. This part of the programme is justified on the grounds of the indirect benefits to be derived in timber production, establishment of new industries, reclamation of idle lands, soil conservation, and relief of congestion. To implement this policy involving a capital investment of the order of £100 million the creation of a new and separate Department of Forests is advocated.

In actual forest operations the Forestry Division continued to progress with its enlarged programme. Planting was almost double the wartime figure and equalled the highest pre-war level while land acquisition showed a distinct upward trend. The nursery area is in process of being trebled from 300 to 900 acres. A particularly satisfactory feature is the steady growth of income from sales of forest produce which now exceed £100,000.

On the industrial side an event of major significance was the establishment here of the Bowater Corporation of Newfoundland, the largest pulp manufacturers in the world. The creation of a profitable market for small thinnings will have a profound influence on the economics of Irish forestry. The setting up of a modern saw mill and kiln-drying plant at Dundrum is another happy augury for the future of native timber.

No review of the past year would be complete without a reference to the passing of the father of Irish forestry, A. C. Forbes. For 26 crucial years he was responsible for the initiation and development of State afforestation and his death marks the end of an era.

EXCURSION.

The President announced that arrangements were now well advanced for the forthcoming annual excursion which this year would be to Scotland. He said that Mr. Clear had very generously donated £15 to cover the expenses of one forester on the excursion. The Society was also providing an equal sum to defray the expenses of a second forester. A sub-committee had been appointed to see that the two lucky foresters would be chosen "by all the laws of chance."

ELECTION OF MR. M. O'BEIRNE TO HONORARY MEMBERSHIP.

Mr. Meldrum in proposing the election of Mr. O'Beirne to honorary membership of the Society said that this was indeed a most pleasant task to him. Mr. O'Beirne was one of our founder members and had served on the Council in many capacities including that of President and the Society owed a great deal of its present well being to his efforts on its behalf. In electing him to honorary membership the Society would be paying a well-deserved tribute to a great Irish forester.

Mr. Ryan in seconding the proposal said his memory of Mr. O'Beirne would always be associated with forestry in Co. Wicklow and in particular with the plantings of Contorta pine on Ballintownbay mountain. This was the first introduction of the species to Ireland and could be directly attributed to Mr. O'Beirne's energy and initiative. He was very glad Mr. O'Beirne had consented to accept honorary membership and his advice and experience would be invaluable to the Society.

The proposal was unanimously carried with acclamation and the President declared Mr. O'Beirne an honorary member of the Society.

STATEMENT OF ACCOUNTS FOR YEAR ENDED 31st DECEMBER, 1950.

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