

HISTORY OF ARDGARTAN FOREST

1. Name

The name is derived from Ardgartan Estate, the mansion house, now a Youth Hostel being situated on the south bank of the mouth of the River Croe.

2. Supervision

Planting started in Forest Year 1925 on the Ardgartan area south of the mansion house, on the hill slope forming the western shore of Loch Long. The officers in control of the Forest since its opening to date have been as follows:-

Conservators

1946 - 1948 A. Watt

1948 to date J.E. James

Divisional Officers

1920 - 1922 A.D. Hopkinson

1922 - 1934 J.M. Murray

1934 - 1938 O.J. Sangar

1938 - 1939 A.H. Gosling

1939 - 1945 J.A.B. Macdonald

1945 - 1946 A. Watt

1947 - 1948 J.E. James

1949 to date H.V.S. Dier

District Officers

1925 - 1927 J. Hunter-Blair

1927 - 1931 J. Fraser

1931 - 1938 A.H. Gosling

1938 - 1939 R.J. Waterman

1943 - 1947 T.E. Edwardson

1947 to date S.M. Petrie

Foresters

1925 - 1926 J. Kennedy

1926 - 1931 H. Spraggan

1932 - 1948 J.M. Reid

1948 to date A. Mackay

3. Brief Description of Forest Area

The area extends to 18,126 acres and was acquired in four blocks in various years as follows:-

Martinmas 1924 from the Trustees of the late Sir Allan John Colquhoun, Ardgartan 7,685 acres of which 2,428 acres were considered plantable.

Martinmas 1928 from the Corporation of the City of Glasgow, Collessan 4,795 acres of which 1,350 acres were considered plantable.

Martinmas 1929 from the Corporation of the City of Glasgow, Pole 2,854 acres of which 800 acres were considered plantable.

Whitsunday 1940 from Major George E. Forman, Corrow 2,792 acres of which 635 acres were considered plantable.

Topographically /

Topographically, the acquired area forms a solid block of ground, north and south of the Cree Valley; to the north as far as the glen from Ben lme known as Coiregroggan which is a tributary to Glen Loin, the eastern march; to the south as far as the Corporation of Glasgow's march across the Ardgail peninsula. The Corrow acquisition is a separate block lying at the head of Loch Gail and extending for a considerable distance westwards where it marches with the eastern boundaries of Glenbranter and Loch Eck Forests.

The afforested area forms a very irregular pattern and consists for the main part of long, narrow, strips of plantation hugging the lower slopes of the glens and the shore of Loch Long. The older plantations are on either side of the Cree Valley, on the shoulder formed by the meeting of the Cree and Loch Long, and on the hill faces of Succoth and Glen Loin, looking eastwards. From the Cree Valley plantations extend southwards on the west side of Loch Long to within a short distance of the entrance to Loch Gail and northwards, with two breaks of still unplanted ground as far as Allt Coire Grogain.

From the west end of Glencroe on the Rest-and-be-Thankful the plantations extend from the Cree Valley along the southern side of Glenmore where they eventually march with the Glasgow Corporation's plantations on Ardgail Estate. A small isolated plantation is established at Butterbridge, on the main Inveraray roadside, west of the summit of Rest-and-be-Thankful.

The forest is extensive and of an elongated shape which considerably increases the travelling time of the Forester and men.

4. Acquired Plantations

Acquired plantations consisted of 14 acres, 7 acres of old mixed wood, mainly in the vicinity of Ardgartan House and 7 acres of pole size conifers on the Corrow area. The Ardgartan woodland appears to have been planted in 1880 approximately and is mainly made up of Douglas Fir, European Larch, Scots Pine, Norway Spruce and Beech. There remain standing some very good specimens of Douglas Fir, some 90 feet in height with a volume of over 100 cubic feet per tree. The Larch is very good but other species are not impressive.

The Corrow woodland is 40 years of age approximately and is a narrow belt, running north and south at about 500 feet elevation. European and Japanese Larch are very poor, the marginal block of Sitka Spruce is excellent but has suffered to some extent from windblow.

In addition to the above, some 530 acres of mixed oak, ash, birch and alder scrub was acquired with the land on the Coileasan block from Glasgow Corporation. The scrub is nowhere of very good quality.

5. Preparation of Ground

During the first few years of planting, 1925 to 1928, very little expenditure was incurred in preparation of ground, apart from the opening of main and feeder drains. This was partly due to the fact that the first planting programmes were on the drier areas and were mainly on bare ground - the Ardgartan shoulder and the Range block - and partly to the fact that the whole scale turfing of Sitka Spruce ground was not then in force. In these years the turfing of ground was confined to the really wet basins and bog areas and it was seldom that any species other than Sitka Spruce was planted on a mound. Much of the first ground to be planted was of a loose friable type with a grass-bracken vegetation and was readily dealt with. In the wet climate which prevails here, there could be no advantage in pitting previous to planting. As the years progressed, the practice of turfing spruce planting increased; gradually the whole of the flatter areas were mounded for these species and in the past few years, spruce ground was given complete drainage to get turf production.

Ardgartan in recent years has had one visit only of a ploughing unit - D.2 Tractor and Cuthbertson plough - for draining and turf production and work was only moderately successful due to the heaviness of the ground and the numerous rock outcrops. Very little planting has been done on this unit since the wholesale ploughing of spruce ground has become the general practice and for that reason and the steepness of ground remaining to be planted, it is doubtful if ploughing units can be used to any great extent.

In the early preparation of ground, scrub woods were completely cleared. The entire scrub area of oak, birch and hazel which occupied the low ground on the 1925, 1926, 1927 and 1928 blocks was clear felled previous /

previous to planting; only one trace of this crop now remains - a patch of scrub on a rocky face in the centre of the 1928 planting.

In later years, natural hardwood scrub and semi-timber crops were less drastically dealt with. In the P.31 area, the oak was partially felled and partially girdled in the form of a thinning, and planting of Norway Spruce was done without interruption through the remaining crop. This has resulted in a good deal of warfare between the retained oak standards and the under-crop of Spruce and has necessitated the sacrificing of part of the Spruce crop and the obligation of doing a considerable amount of additional girdling and cutting to let the fast growing conifer get through to the light.

Subsequently, in the Coilessan block, in the planting years 1933 to 1937, very extensive areas of scrub had either to be treated or left as part of the standing crop and the magnitude of the planting programmes made it impossible to deal with these scrub woods in an intensive fashion. To begin with, a good deal of felling was done but the cost of the work made it imperative to ring more and fell less. Preparation of the scrub ground, felling, girdling, snedding and burning was not to cost more than £5.10/- per acre (a man's rate of pay was then £2 per week) and to get the programme completed, felling by groups and ringing by groups were resorted to but in spite of this, large areas of conifers were planted direct without interruption through scrub ground with a complete canopy. These portions of the crop are still receiving attention.

6. Methods of Planting

The tools most commonly used in planting were the Schlich planting spade, the nursery spade and the mattock. A trial was made with "clay" spades in planting *Pinus Contorta* and *P. Montana* but the men did not like them and they were abandoned. In the early thirties, it was decided that the planting of Norway Spruce was being done too deeply and use was made for a time of the modified notching spade - "bastard spade" in order to make a shallower notch, allowing more root spread. Turves were always planted with the Schlich spade and nursery spade. Screefing was resorted to on most areas where vegetation was heavy.

Planting /

Planting distances varied from 5' to 6' for the Larches and Douglas Fir, 4½' to 5' for the spruces and silver fir and 4' for Pines on harder ground. Interplanting through scrub varied the spacing of much of the Spruce, Douglas Fir and Beech. Beech and some few maples appear to have been the only broadleaved trees planted in Ardgartan Forest.

7. Early Years

It is apparent that in the early years, the main object was to obtain one hundred per cent successful planting over the entire area selected for each planting year and there is no doubt that this end has been achieved. The older plantations are fully stocked over the entire area and beating up of plantations was both methodical and intensive. Every ailing or dead plant was replaced and the earlier Douglas Fir blocks were frequently beaten up with Sitka Spruce.

Drainage, apart from the present necessity of turf production on these western type areas, was considerably less intensive than in modern practice. Much of the land was provided with main drains only; very few trap drains and feeders are evident and comment was made at the time that many of the drains were too steep. This seems to have been the case but doubtless the negotiation of hummocks was not always easy and in the absence of natural water channels, it is frequently necessary to have drains steeper than is actually desirable. In many places, the mains are stream tracks.

The planting operations during the first year were commented upon favourably and were stated to reflect credit on the Forester, Mr. Kennedy. Among the numerous climatic and other factors which tend to make imperfect man's attempt at large scale afforestation, early troubles at Ardgartan were windshake of Douglas Fir areas, necessitating the staking of many of the plants, blackgame damage to promising young Larch crops and prolonged periods of check in Spruce areas which had been planted direct. Deer required constant attention and the recruitment of a second trapper for the Coileissan block. In later years, the vole plague played havoc with young plantations being established in the early thirties and local damage is being done by these pests to this day.

Compartments were made of large size averaging 30 acres and most rides - Compartment boundaries - run with the slope of the hill. The average /

average elevation to which planting has been done is approximately 900 feet on the Glenmore - Glencroe shoulder and in the Butterbridge detached block, plants have been carried up to 1,200 feet without much sign yet of die-off at the upper limits but with markedly slower growth.

First plantings were on the eastern shoulder of the Brack and were then carried across to the Range block of Succoth. In 1928 a return was made to Glencroe which was afforested along the south side returning by the north side. Subsequent to that, there was no steady sequence of planting over one whole area; the south end of Glen Loin was planted and planting areas then are scattered over various parts of the forest.

8. Choice of Species

Climate and Exposure. The climate is typical of the western seaboard of Scotland with no extremes of heat or cold and very high rainfall. Annual figures show the average rainfall to be between 80 and 90 inches. Snow is infrequent and does not generally lie long below 1,000 feet. Any hard dry weather is generally experienced in the Spring thereby increasing the danger from fire. Late frosts are frequent and damaging. Winter gales are common and are to be feared from the thinning stage onwards due to the heavy rainfall and proximity of rock to the surface.

Exposure on western slopes can be very severe due to Atlantic gales and the western position of the district. There is no land mass between the majority of forests and the Atlantic ocean and thereby no break to the strong prevailing winds coming directly off the sea. The limit of planting is thereby much reduced in comparison with eastern localities and it is seldom possible to plant higher than 900 feet even when the quality of the ground above that altitude is sufficiently good for conifer species.

Geology. Mainly metamorphic - quartzites and schists with some igneous intrusions. The metamorphic rocks were originally sediments such as impure sandstones, shales, limestones, etc., but their mineral composition and structure has been greatly altered due to intense heat and pressure. They may be recognised by the presence of marked cleavage or foliation which causes them to split very readily in one direction.

The primary rocks have been formed by the consolidation of molten material and may be distinguished from the metamorphic rocks by their more homogeneous /

homogeneous nature.

Excluding the glacial deposits which are still loose and uncompacted, the region shows no rocks other than metamorphic and igneous types.

Soils and Vegetation. The main soils are:-

- (a) Deep fine loams derived direct from the parent rock.
- (b) Gritty or rocky loams and clays of glacial origin.
- (c) Peats generally shallow over gritty or rocky loams and clays.

Soil type (a) carries a vegetation of scrub, bracken and the finer grasses, type (b) calluna and hill grasses, and type (c) molinia/juncus associations if of better quality and scirpus, erica and vaccinium if of inferior quality.

The selection of species followed the pattern commonly associated with west of Scotland areas. The lower slopes are comparatively sheltered, particularly in Coileissan where the aspect is easterly and are mainly mineral soils with a thin layer of peat in places. On ground above the 600 foot mark, there is an increase in the area and depth of the peat covering but apart from some of the high ground in Coileissan and Glen Loin, it is nowhere very extensive. Slopes are steep, preventing peat formation and as a result, there is a high wash off of soil in this heavy rainfall region, particularly after the killing off by the tree crop of surface vegetation and subsequent opening of the canopy.

The species selected for planting are as follows, in order of diminishing abundance:- Sitka Spruce, Norway Spruce, European Larch, Japanese Larch, Douglas Fir, Hybrid Larch, Beech, Scots Pine, Pinus Contorta, Abies Nobilis, Mountain Pine and Cypress.

Sitka Spruce. This species has been planted over the greater part of the high ground, on the wet flats and in later years almost pure over the entire Glenmore Section. The soil covering prior to planting was various bracken, rush, grass, then heather and molinia, pure molinia and bog myrtle.

Norway Spruce. This species was confined mainly to low ground and to scrub woodland. The bare ground which had a mixture of pasture grasses was almost entirely afforested with this species; in Glencroe, it was used to a certain extent in a grass heather mixture near the Wee Rest.

European /

European Larch plantings were mainly in the P.25, P.26, P.27 and P.36 areas, on the middle slopes where the vegetation was a grass bracken mixture or pure bracken and natural drainage was free.

Douglas Fir was confined almost entirely to the first two planting years, P.25 and P.26 where it was kept to the lower ground, on land of good quality previously under hardwood scrub. Small isolated patches of the species were also planted on pockets of deep rich soil and in small scrub areas in the Coilessan block. A considerable area of oak scrub near Knap point has been underplanted with Douglas Fir in P.36.

Hybrid Larch occupies one block only on the middle slope of the Ardgartan planting, P.25 on ground similar to that selected for European Larch. There are 14 acres only of this species.

Japanese Larch is found in small scattered patches in all P.years between 1935 and 1941. It has been planted mainly on loose mineral ground of free drainage with a bracken vegetation. It has been in check for some time on some light heather knolls at the western end of Glencroe.

Beech. A block of this species was underplanted through a strip of oak in the P.31 area where there is good quality type soil with a hardwood vegetation; honeysuckle is abundant. A strip of Beech was also planted between the Coilessan and Ardgartan blocks in 1931 where it now forms a useful fire-break and shelter.

Scots Pine was used chiefly on heather and heather/molinia knolls where peat was present. It has been one of the chief species on some of the high Coilessan ground and on lower slopes in Glenlolin. Otherwise it occurs in patches only.

Pinus Contorta was used very sparsely and to the greatest extent in P.31 and P.36 in Coilessan Glen, almost entirely on ground with a thin peat covering and a vegetation of heather with sparse molinia. It has been used to a lesser extent on a few sour flats in mixture with Scots Pine, Mountain Pine and Sitka Spruce.

Abies nobilis was planted only in P.26-27 Range block and a small patch in P.34 Coilessan. The former groups are on a good free soil type of ground with good drainage. The Coilessan patch was planted on a small area of very heavy bracken growth.

Mountain /

Mountain Pine. This species was planted solely as a nurse with Sitka Spruce over very limited areas, on ground similar to that under Pinus Contorta.

Cypress. A small block of this species was established in P.26 in the Range block on an area of selected ground and encircled with Sitka Spruce.

9. Results of Early Planting

The results of the early plantings may be said to be on the whole excellent and it is clear that in these days, 1925 to 1936 when maintenance work was less and the production side had not arrived, closer attention to the block being afforested, more intensive beating up and generally good selection have established a forest area of which there is very little to be ashamed. With the exception of the European Larch areas and a few sour, low-lying flats, a very solid and thriving block of woodland has been brought into being and if maintenance of drains and thinning can keep pace with the rate of growth of the principal species, the present conditions of the older stands should be maintained and improved and a substantial volume of timber of good quality should be produced in the years ahead.

The Douglas Fir of the early planting is particularly impressive, of a size and quality equal to most stands of its age in the country. In spite of the early staking of the plants which was necessary, the trees made rapid progress and are of good form. It can be safely said that there is not a poor or badly developed acre of this species in the Forest. Similar remarks may be made concerning the block of Hybrid Larch which suffered early damage from blackgame. It is now everywhere of splendid growth and quality and is reckoned to be the most outstanding block of this species in the Cowal district.

European Larch of the early plantings has not done well. Growth has been very slow during the entire period and all areas of it have been badly affected by canker. In later years, it has suffered very much from die-back with the result that crowns are now very restricted and stems are far from straight. Growth is still slow but a severe opening out of the crops in 1942-43 seems to have put some fresh life into the trees. This applies to the P.25, 26 and 27 areas; a fairly extensive block of the species in the P.36 /

P.36 area has so far not suffered and is looking comparatively well.

Generally the Spruces have made more than satisfactory growth, particularly on the middle slopes where the better quality soils occur and where drainage is free. It is apparent on some of the bottom slopes and flats that there has been a period of check in early years which might have been partially overcome by turf planting; these sections are now being frequently passed over in first thinnings which are now in progress on these areas. The most thriving blocks of Norway Spruce are in the P.31 area on old scrub woodland and in the P.35 area on strong pasture grasses.

Generally the early plantings have given very good results and if those of a later date do equally well, there should be little fault to find with them. The selection of species has varied very little since that time; more Sitka Spruce is being used than previously and less Douglas Fir and in latter years, the nature of the ground has not given much scope for the use of Larches. Since 1937, no scrub ground had to be dealt with so that no material was available for shelter and shading purposes nor was there land of the right standard for the more shade-bearing conifers. It is possible that a good deal more of Pines could have been used with advantage, the Scots Pine for breaking up large Spruce blocks and the Mountain and Contorta Pines for high edges, hard flats and exposed ridges.

10. Research

Very little research work has been carried out at Ardgartan Forest. It is not known why it was so forgotten in this respect. The only experimental work carried out has been the recent establishment, in 1950, of three permanent sample plots in the P.28 area. These plots were laid down in Sitka Spruce in Compartment 11, each of $\frac{1}{4}$ acre and in 1950 were given respectively an L.C, a C/D and a B grade thinning. The volumes per acre removed in each case were 265, 248 and 7 cubic feet. The total crop yield to date per acre is 1700 cubic feet. Plots are at 900 feet elevation, moderately sheltered, slope of 21 and are on Mica schist, $\frac{1}{2}$ " covering of needles, $\frac{1}{2}$ " black light loam, 5" ashy grey, streaked with black, heavy loam, slightly shaly, 13" to 14" reddish brown clay silt mottled with orange. There is no vegetation.

APPENDIX I

Notes from Inspection Reports and Other Documents

Inspection Reports

7th September 1925	Chairman's Inspection
20th February 1928	Commissioners' Visit
24th August 1947	Chairman's Inspection
19th June 1949	" "

Other Documents

1st July 1929	Divisional Officer's memo.
8th July 1929	District Officer's memo.
15th October 1930	Divisional Officer's memo.
5th November 1930	" " "
26th November 1930	Divisional Officer's memo.
1st November 1948	District Officer's Annual Report
1st November 1949	District Officer's Annual Report
1st November 1950	District Officer's Annual Report

The early Inspection Reports referred principally to planting and the growth of plants. The first planting P.25 was noted as being very satisfactory and as reflecting credit on the Forester. Mention was made of the need to stake wind-shaken Douglas Fir, of the trial of turf planting Sitka Spruce where in check on well drained Molinia ground and of blackgame damage to Hybrid Larch. Later reports were concerned with the treatment of the scrub area of Collessan which has been underplanted with Spruce and Douglas Fir. On his last mention of this area the Chairman states that the best we can hope for on this section is a mixed hardwood-spruce forest which should be useful and at the same time protects the amenities. Remarks were passed too, on the marking of the second thinning in the Douglas Fir which had in an earlier report been mentioned as suffering from wind-shake in early youth.

Divisional and District Officers' memos were principally concerned with the cost and methods of dealing with scrub areas; the cost was referred to in one memo as being far too high at £7.10/- per acre for felling and burning; in another as still too high and of the need to keep it no more than £3.10/- per acre. More ringing and less felling was recommended /

recommended. In one memo., the District Officer suggested the felling of birch below 3" diameter only, felling of all hazel, ringing of birch over 3" diameter and laying-in of large oak. Systems were obviously varied from time to time.

Other instructions dealt chiefly with fire protection and types of tools.

From Annual Reports, areas afforested, beat up and thinned give a general idea of the work carried out each year. Very little thinning was got over prior to 1940. From that year onwards, thinning was spasmodic, dealing mainly with the accessible Douglas Fir, Larch and Hybrid Larch in the Range block and in Ardgartan. No doubt the lack of labour was responsible for these small areas only being tackled and for dealing mainly with accessible patches. From 1947 onwards, thinning has largely been put in the hands of private merchants and in the following four years half of the P.25-26 block had been thinned, half of the P.27 block with the remaining halves of both these on offer. The P.28 block is now being prepared for similar treatment.

Reports show that considerable beating up programmes were carried out in the years 1949, 1950 and 1951. Earlier, large afforestation programmes had made it impossible to repair previously planted areas and the normal death rate over this ground, together with blocks where vole damage had occurred or where lack of attention to bracken was evident, made it essential, when no new planting had been agreed to for several years, to complete the stocking of these neglected areas. This work has now been largely completed.

APPENDIX II

District Officer's Notes

1. Silviculture and Management of the Forest

It was evident from the condition of this Forest at the end of the second war that it had suffered severely from lack of labour and from the absence of a regularly fixed plan of work to cope with arrears of maintenance in conjunction with new afforestation. The later afforested areas from 1940 onwards did not appear to have had the same close attention until such time as they could be said to be established as the first plantings. The arrears of drain repair work, beating up, cleaning (including brashing) and thinnings which had accumulated by 1947 were of a frightening nature and in discussions with the Forester, it was agreed that the only way in which, with the existing low labour force and pending the building of houses, any shape could be made at an attempt to put the forest in order was to:-

1. Close down the Nursery at Succoth.
2. Leave all thinning work, felling and extraction to Timber Merchants.
3. Avoid new planting for a lengthy period, and
4. Concentrate the labour force in restocking of thin patches, five years of age and under, brashing of plantations, maintenance of drains and renewing drains in following up the Timber Merchant's work of thinning.

These objects were generally attained, standing sales are in progress, Succoth Nursery is down to grass, all beating up has been completed and inroads are being made into the huge brashing and drains repair programmes. Arrears are still tremendous.

2. Growth of Species Planted

Sitka Spruce has generally been successful over those parts of the Forest on which it has been used. As previously mentioned, it is at its best on the middle slopes and in depressions of soft rush ground, even at fairly high altitudes. Its rate of height growth over such areas is approximately three feet per annum from a height of twelve feet onwards; it is very much slower on the high ground, chiefly on the shoulder of Glenmore above /

above Rest-and-be-Thankful and on the Butterbridge block which is an isolated high lying plantation from 700 to 1,100 feet elevation and very subject to draughts. It has been in check for some time in pure heather ground in small patches of the Coilessan block and it is very obviously a wrong type for underplanting or for standing even the smallest amount of shade. As in most Forests in the West, it has suffered from late frost damage locally, due to its early growth, and lack of timely thinning has resulted in various stands of the species which might be more fully developed in the crowns than they are. So far, in Ardgartan, Sitka Spruce has suffered nowhere extensively from wind-blow but thinning of the species has as yet been almost entirely on the firmer, drier ground. The Sitka Spruce in Western forests has proved to be a very useful species on high exposed ground where soil and moisture conditions are suitable and its growth is good even at the limit of tree planting. Because of this feature, the Chairman instructed that the planting limit of the P.25 and 1.26 areas be taken higher and that Sitka Spruce be used for this purpose. This was done in 1938 with satisfactory results.

Norway Spruce has made good growth on the sheltered mineral sites and on old scrub woodland. Very little of this species was planted prior to 1931 when a block on the lower slope of the Coilessan area, partially cleared, partially girdled scrub was afforested with Norway Spruce. Results are very promising. A full crop has been established which, slow to begin with, is now making rapid growth. In the P.28 and P.35 areas, similarly good results have been obtained in ^{low} pasture grass types. Where the species was used in grass with sparse heather in P.29 and P.30, it has not made very good progress and even at this late date, it will be many years before it will require thinning. Repairs to drains may assist it as these fall to be done. Both Norway and Sitka Spruces have suffered severely from late frosts in the vicinity of the River Cree.

European Larch. Afforestation with this species was done in P.25, P.26, P.27, P.35 and P.36. Much of the original planting in P.35 was beat up with Japanese Larch and very few of the common species remain there. The sites chosen for this tree were loose mineral soil types with mainly

a grass-bracken vegetation, free drainage, slope moderately steep and appear to be of the kind perfectly suited for the species. Whether due to a bad strain of seed, with inherent lack of vigour or to soil or climatic conditions, it is not clearly known but all Larch areas, except the youngest, P.36, have shown the poorest development. Canker and die-back have seriously affected these woods and at present the trees are little if anything over 25 feet in height with an average quarter girth at breast height of 5 inches.

Hybrid Larch. One stand of this species has been established in the P.25 area and it is now of excellent quality after a third thinning. After initial damage by blackgame, the trees never looked back and are now everywhere of excellent form and quality. The area has had three thinnings.

Japanese Larch. This species was not used in afforestation at Ardgartan until P.34. Its growth has been moderately good but somewhat rank and coarse on sheltered sites where soil is good. It will make better quality stands on the slightly more exposed areas on sparse and heather grass sites where growth is not so fast. Best stands are in the Coileasan block.

Douglas Fir was mainly planted in the early years and is at its best on the lower slopes of the Ardgartan area, P.25 and P.26. In the first years of its growth, it suffered from wind resulting in a large number of bowed stems and slightly leaning trees. These have almost all been removed in thinnings and an excellent stand now occupies this ground, best trees being of approximately 60 feet in height with volumes per tree of 8 to 10 cubic feet. The form of the trees is very good and crown development is satisfactory; with progressive timely thinnings, this should be maintained and a crop of Benmore Cruach Wood quality can be foreseen.

Scots Pine has been planted only locally and hardly at all until 1934, where it has been used in sizeable areas such as the P.34, P.35 and P.36 blocks, it is promising although slow of growth in comparison with most of the other conifers and it is of healthy appearance and good shape. It has suffered severely from wind blast on exposed knolls and in wet heather areas in the Coileasan Section, it has failed miserably and has suffered severely from deer.

Pinus Contorta, although a most suitable species for poor soils and exposed sites, is not at its best in the wet peat types to which it has been confined at Ardgartan. This species does not thrive on soft wet ground, whether of a peaty nature or not and gives of its best on stiff hard subsoils with little or no aeration and almost complete lack of soil cover. There are none of these hard sandstone or boulder till infertile types at Ardgartan and this species, the best that can be adopted, has been given the poor pine sites which are not entirely suitable. Growth has been moderately good but the trees are not so well furnished as they should be and foliage is tinged with yellow instead of being fresh and grass-green. It is useful in forming a shelter and nurse to small areas of Spruce. Best crops are in the P.31 area where height growth of the best trees is about twenty feet.

Mountain Pine of the erect type, where it has been used to a small extent as a nurse for Spruce in the P.26 and P.27 areas, has made good progress; trees are of good form, healthy appearance and vigorous. Best specimens are approximately 15 feet high. The only sizeable pure groups of the species are at the upper limit of the planting on the P.28 area, at a height of about 700 feet but there, although the trees are healthy, they are only of 8 to 10 feet in height.

Abies nobilis as already indicated is not extensive but has developed well in the P.26, P.27 block where it has equalled Sitka Spruce in rate of growth.

Cupressus Lawsoniana planted in a small area in the P.27 block has made quite good shape and is somewhat behind the Spruce in size. A recent thinning should assist it and most of the double stems have been singled.

Beech has been used in underplanting an oak area in the P.31 block and now forms a promising understorey to the selected oak stems which have been retained. The beech, up to 20 feet in height is of a very attractive type, straight stemmed and with nicely balanced crowns. No doubt the top and lateral shade have drawn it up and improved its form and a pruning carried out in 1950 has still further enhanced the appearance of this stand.

3. Natural Regeneration

There is no evidence as yet of natural regeneration in any of the stands at this Forest and the older crops are still at too immature a stage to /

to contemplate such a possibility being successful. In later years, regeneration of Sitka Spruce, Douglas Fir and Pinus Contorta can be hoped for.

4. Wind Damage

To date there have been no serious collapses due to windfall at Ardgartan. The area thinned so far is not extensive and it is noticeable in many of the forest areas in this part of the country that plantations are not seriously affected by wind until such time as thinning is done, particularly too long delayed thinning. There has, in addition, been no breakage of plantation edges for road construction or other reasons although this will eventually be necessary and is the most prevalent cause of windfall. Thinning has been confined for the most part to moderately sheltered localities lying away from the prevailing wind and has not so far been done on any very exposed parts of the forest. In the Douglas Fir area of Ardgartan, there have been falls of single trees from time to time but nowhere in any large quantity. Elsewhere in the Forest, isolated cases of windfall have occurred on wet areas where attention to drainage has fallen behind and on the western margin of the F.26 block, the near presence of a drain to the outside row of trees caused a few of these to collapse in the severe gale of December, 1949.

5. Drainage Upkeep

This work has fallen behind to a great extent at Ardgartan Forest and one of the difficulties now is that the stage of growth of most of the plantations makes it impossible to attend to the drainage without first doing a great deal of brashing. With thinning in progress over large areas, it is essential to follow up extraction with drain repairs. As a result, as rapid progress as would be liked is not being made with the attention to drains on other areas. These are, however, being repaired whenever other more urgent work permits and in order of most urgent necessity. Work has been completed in some of the most pressing cases such as the flat ground in F.40 area, the Spruce-fine plantations in F.31 area and the entire Glenmore and Butterbridge blocks.

6. Rate of Growth and Volumes of Thinnings

Thinning work at Ardgartan was begun in F.Y.38 but from that year until /

until P.Y.47 it was of a rather spasmodic nature and was confined entirely to the more advanced groups of trees in Compartments 1 to 5 and to Larch in the Range plantation, Compartments 55 and 56. The species dealt with were Douglas Fir, Hybrid and European Larches and they were mainly on accessible sites. A thinning series has now been drawn up and with the help of standing thinning sales, it is hoped to adhere to it but the delay by Merchants in keeping to the time limit of their contracts has resulted in a falling behind the schedule so far.

Thinnings during the late Thirties and early Forties were briefly as follows:-

P.Y. 38	7 acres Hybrid Larch	P.25	1st thinning
P.Y. 41	5 acres European Larch	P.26	1st thinning
	12 acres Douglas Fir	P.25, 26	1st thinning
P.Y. 42	13 acres European Larch	P.25	1st thinning
	18 acres Douglas Fir	P.25	1st thinning
	4 acres Hybrid Larch	P.25	2nd thinning
P.Y. 43	5 acres Hybrid Larch	P.26	2nd thinning
	12 acres Douglas Fir	P.25	1st thinning
	9 acres European Larch	P.25, 26	1st thinning
	1 acre European Larch	P.26	2nd thinning
P.Y. 44	6 acres Hybrid Larch	P.26	2nd Thinning
	22 acres Douglas Fir	P.25, 26	2nd thinning
	9 acres European Larch	P.25, 26	2nd thinning
P.Y. 45	13 acres Douglas Fir	P.25	2nd thinning
	3 acres European Larch	P.25	2nd thinning
	1 acre Sitka Spruce	P.26	1st thinning
P.Y. 46	26 acres European Larch	P.25	2nd thinning
	9 acres European Larch	P.25, 26	1st thinning
	2 acres Douglas Fir	P.25	2nd thinning
P.Y. 47	2 acres Sitka Spruce	Acquired Wood	1st thinning
	3 acres Japanese Larch	" "	1st thinning
	6 acres Hybrid Larch	P.26	2nd thinning
	1 acre Douglas Fir	P.26	2nd thinning
	1 acre European Larch	P.26	2nd thinning
	2 acres Sitka Spruce	P.26	1st thinning
P.Y. 48	18 acres Sitka Spruce	P.26	1st thinning
	2 acres Japanese Larch	Acquired Wood	1st thinning
	9 acres European Larch	P.26	2nd thinning

It will be observed that during these years thinning was confined chiefly to the first established Douglas Fir, Hybrid Larch and European Larch. In almost all cases, first thinning consisted of cutting out blown trees only so that the operation was not a thinning proper and yields obtained were of little value in assessing possible volumes to be expected. The Hybrid and European Larch areas in P.25 and P.26 were gone through several /

several times, removing blown and badly shaped trees and the latter species was so poor and so cankered that it was heavily opened out in both these P.year blocks and now stands very thinly on the ground but shows some signs of returning vigour. It will be noticed too, that no thinning in Sitka Spruce was done until 1945.

In F.Y.49, after drawing up of thinning plan, the whole of Compartments 1 to 4, P.25 and P.26 were marked and offered to the Trade. A systematic marking was done through all species, E.L., J.L., S.S., and D.F., already worked over and not yet worked over in these four Compartments. The lot was sold and volumes per acre of the species sold, thinnings were as follows:

Sitka Spruce	1st thinning	297 cubic feet
Douglas Fir	1st thinning	300 cubic feet
Douglas Fir	2nd thinning	661 cubic feet
Hybrid Larch	2nd thinning	271 cubic feet

There was little to mark in the European Larch but the worst stems were included to keep the marking continuous over the whole block.

In F.Y. 50, a similar marking was done in the remaining three Compartments, No. 5, 6 and 7, of this Ardgartan P.year block and very similar results per acre in marking were achieved. This lot has not yet been sold but a block in the Range plantation Compartments 55, 56, 57, also P.26 was sold to the same merchant. This wot was entirely Sitka Spruce, almost 100% first thinning and the volume per acre to be removed was 312 cubic feet.

A second lot in this plantation, in the P.27 area, Compartments 49, 50 and 51 was recently offered and has been sold. The species is mainly Sitka Spruce with a small addition of European Larch and Abies Nobilis. The volume per acre over the lot to be removed is 460 cubic feet, somewhat higher than the others but no previous interference had been done by previous cleaning here and the stand is particularly regular and free from blanks.

Marking is now proceeding in preparation of the P.28 block for sale.

Thinning is considerably in arrears at this Forest and only by large area standing sales can it be brought to normal. The areas of species in the Forest coming into the first thinning stage are extensive, not all accessible /

accessible and not all in well defined blocks. Sitka Spruce (2470 acres) is the main species and plots show that a first thinning volume of 400 cubic feet per acre can be obtained, leaving an approximate volume standing of 2000 cubic feet. Douglas Fir (75 acres) is a heavy yielder and volumes of 300 cubic feet per acre (first thinning) and 500 cubic feet per acre (second thinning) leaving a standing volume of 3000 cubic feet per acre is the rate on low sheltered ground. European Larch (147 acres) as already mentioned was very abnormal due to a poor type plant, canker damage and die-back and no satisfactory results are available. The standing crop at present was less than 1000 cubic feet per acre. Hybrid Larch ($11\frac{1}{2}$ acres) has yielded a very large volume over three thinnings, almost 1000 cubic feet per acre and the volume standing is now 4000 cubic feet. So far very little thinning has been done in Japanese Larch ($42\frac{1}{2}$ acres) but a first thinning in this species in the P.32 area yielded 300 cubic feet per acre, leaving 1100 cubic feet standing. Norway Spruce (808 acres), Scots Pine (189 acres) and Contorta Pine (105 acres) have not yet been dealt with.

Other areas of species in the Forest are Sitka Spruce plus Pines, 31 acres, Mountain pine 35 acres, Abies Nobilis $5\frac{1}{2}$ acres, and Norway Spruce plus Pines 15 acres. There are small lots of other mixtures. So far, no thinning has been done in these mixed crops but it is noticeable that where Sitka Spruce and common Larch have been in mixture that the former species has developed much better than in pure stands, at some expense to the Larch which on being removed leaves a well proportioned crop of Spruce.

7. Replanting

Due to the fire damage in the P.26, 27 block, Range plantation, 50 acres had to be replanted. The fires occurred in 1930 and 1944 and replanting with Sitka Spruce was carried out in the following years.

8. Under

Underplanting was done with Beech under Oak on the low ground in P.31. The Beech have developed exceptionally well and are now up to 20 feet in height. Some opening out has been done among the poorest Oak to assist them and the understorey was pruned in 1950.

Underplanting with Norway Spruce and Douglas Fir was done in Oak scrub in the Collessan block in P.years 33, 34, 35 and 36, the intention being to /

to girdle the hardwoods later as was required by the conifers. The species planted have done comparatively well but the work of relieving them and admitting more light has not kept pace with their rate of growth. This cleaning work has fallen behind, to the detriment of the conifers but is receiving attention as often as other more pressing work allows.

9. Nursery

For some time, from 1945 to 1949 there were two separate nursery areas at Ardgartan; Succoth nursery at the southern end of the Glen Loin arable strip and Corrow nursery on one of the arable fields on the lately acquired area at the head of Loch Goil. Neither of the nurseries was of the first class; they were not entirely suitable for seed sowing due to site and soil conditions and were mainly used as standbys for lining out.

Succoth nursery, of 4 acres, was opened in 1942. It occupied a flat, semi-sheltered site with a somewhat heavy soil, not easy of working and and prolific of weed growth. In its earlier years some good breaks of transplants, mainly Spruces, were produced but latterly it was somewhat neglected due to labour shortage in the war years and with lack of sufficient cultivation and manuring, it was decided to be rather a costly proposition and was closed in 1949. The ground was resumed by the Estate Branch as part of Succoth Farm.

Corrow nursery, also 4 acres, was opened as a lining out nursery in 1945 probably with the idea of having a near at hand supply of plants for the afforestation of Corrow hill. The nursery has a moderate slope and an easterly aspect and is of a satisfactory soil type provided it is worked on a proper rotation and kept in good heart. It is probably a better Pine-Larch nursery than a Spruce one and has a useful degree of exposure. The climate and soil do not encourage its use for seed sowing when more desirable nurseries for this purpose are near at hand. It is still in use for transplanting.

10. Housing

At present there are 21 Forestry Commission owned houses at Ardgartan, one of which is occupied by the Head Forester, one by the under-Forester, one by a Foreman and two by the Caravan and Camping Field Wardens who are employed in the Forest during the winter months. Succoth Farm house is occupied /

occupied by the Farm Manager and a Shepherd's Cottage is also attached to the Farm which is in the Commission's hands, administered by the Estate Branch. A house in Glenoroe is under a life tenancy to a former trapper's widow and all other houses are now old and require considerable expenditure on upkeep.

Thirteen new Swedish houses have been constructed, one single type for the Head Forester and twelve semi-detached for workers. The occupation of these should help to reduce the labour shortage.

There are two hostels in the Forest - Corrow Hostel for ten men opened in 1947 and Glen Loin Hostel for fourteen men purchased from the Scottish Youth Hostels Association and to be put into commission shortly.

11. Roads

Ardgartan is at present served by two roads only, to Collessan and Succoth, both in very bad condition, other than the main County Arrochar - Inveraray road. Road construction has fallen behind due to lack of accommodation and labour but with the opening of the new hostel in Glen Loin it is hoped to get work begun on repairs to the two existing roads and on a new road through the P.28 area. Considerable road work is urgently needed here to open up the Forest for extraction, particularly to encourage purchase of standing lots.

The old Rest-and-be-Thankful road is at present unused but will be made use of in due course for timber haulage. It is leased to the Royal Scottish Automobile Club for an annual sports car racing event which draws tremendous crowds.

12. Argyll Forest Park

This forest is one of the main centres in the Argyll National Forest Park and the near presence of various high tops such as the Brack, the Cobbler, Ben Ime and Ben Donich, all within the Forestry Commission area, makes it very popular with mountaineers and hikers. Caravan parks and camping fields have been set aside on Loch Long shore and access paths through plantations have been signposted for walkers to the high ground. Ardgartan house is now a Youth Hostel. Complete advantage is taken of these amenities by the public but fire danger is considerably increased thereby.

(signed) S.M. Petrie.