ALICE HOLT

FORESTRY COMMISSION

HISTORY

OF

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FOREST

SE(E) CONSERVANCY

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of

ALICE HOLT FOREST

- 1951 -

SOUTH EAST (ENGLAND) CONSERVANCY.

History of Alice Holt Forest

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HISTORY OF ALICE HOLT FOREST

CHAIRMAN'S COMMENTS

Alice Holt was managed from 1912 until 1919 by Crosfield under my supervision. Previously it had been under the charge of the Deputy Surveyor of the New Forest who, in the early years of the century at least, used to drive over in a carriage and pair from Lyndhurst for occasional visits. Crosfield's people lived near Rowledge Church and he gave detailed attention to the forest up to his death in 1919. His death was a great loss to the Forest Service.

I have paid numerous visits to the forest since 1912. Some of these inspections were not noted, but there are notes on inspections in 1922, 1925, 1927 (two visits), 1929, 1930, 1933, 1934, September 1943, February 1945, March 1946, April 1948 and December 1948 not referred to in the attached account.

We took Schlich's Working Plan as the approved plan but gradually introduced some modifications:

(1) It seemed that even in the best oak some oak regeneration should go on in order to begin to break up the age classes.

(2) The proposed selection system in Lodge Inclosure was replaced in due course by a group system of regeneration.

(3) Underplanting of old oak was not proceeded with though Crosfield did one or two small patches which I could not identify in later years. I was already beginning to doubt (from what I had seen of its effects on old oak in Highmeadow) the advisability of underplanting semi-mature oak.

The species trials (now containing sample plots) in Glenbervie which had been laid down in 1905 were beginning to show up a little, but the Sitka spruce showed no promise at all and for several years was neglected. It then appeared to have made a surprising recovery (we knew little about the behaviour of Sitka spruce at that time). I supervised the first thinning and I was very pleased with the crop. I think that thereafter two

mistakes were made:

(1) Thinnings were not often or heavy enough.

(2) An injudicious felling of old oak on the windward side led to heavy windfall.

Nevertheless the production of timber has been high (ranking next to Douglas fir) and the current increment of the plot in 1943 is stated at 230 cu.ft.

The Scots pine/European larch mixtures planted earlier on the clays (by Lascelles) were not very satisfactory but Scots pine was satisfactory on the lighter soils where the 1883 Corsican pine near Rowledge Church was outstanding. The value of Japanese larch was not at all clear.

There was thus only partial evidence locally as to which conifers to plant in replacement of oak and some of Crosfield's planting must be judged in that light.

There was no evidence as to the best method of regenerating oak and the real necessity did not arise until fellings arising out of the 1914/18 war were made. There had been a good oak mast in 1914 but the only immediate use made of it was a group behind the forester's house in Compartment 75. There was a good deal of regeneration in the old oak round the original group but it was left for two years or so and did not respond when opened up. Some of this 1914 natural seeding turned up later in two or three groups in Lodge Inclosure.

The strip and group planting in Straits Inclosure had an interesting early history. As noted by Mr. Troupe the object of leaving side shelter was to get some protection against frost. The young oak developed very slowly and none of the cultivation devices (e.g. hoeing) had any appreciable effect. Weeding went on by fits and starts and at great total cost, and the general appearance of the young crop was discouraging. So much so that I received a proposal that the areas should be replanted with spruce. However, I decided that having set out to get an oak crop we would persevere, and it soon became clear that we should get one. This was the best lesson I learned about oak planting, viz. that patience is an essential ingredient of oak cultivation (as indeed of most other hardwoods). As regards weeding generally, I think we would have got off cheaper if we had consistently weeded hard in

the first three years or so and then restricted it to those species such as sallow and ash coppice which grow very quickly and suppress or elbow out the oak plants. A small patch of oak/Norway spruce planting has shown that excellent oak can be raised in that way provided the spruce are removed in good time.

In the upshot we have got satisfactory oak plantations in the Straits. The extensive experiments started there in 1927 do not seem to have proved more than this: that ordinary planting methods at moderate spacing combined with consistently hard weeding is as satisfactory a procedure as any other.

The group regeneration in Lodge Inclosure has met the three-fold objectives of securing produce, getting good regeneration and maintaining amenities. Some mistakes have been made, the chief perhaps being failure to enlarge and subsequently to coalesce the individual groups quickly enough. In other words too many groups were started in relation to the prescribed annual fellings. Some of the replanting of enlargements was also delayed too long. Oak and beech have responded best to the method; sycamore looked very promising to begin with but subsequent development has not kept pace with early promise. The hornbeam plot has done surprisingly well.

As regards the conifers on the well-drained clays, Douglas fir has done best which does not surprise me. Corsican pine is best, as was to be expected, on the light soils.

The Future of the Forest. There is now a great deal of reliable data on the growth of species and the techniques of growing them. There are, however, several major problems ahead:

(1) Allocation of land to oak and conifers respectively

I have always felt that if necessary a greater proportion than the Schlich Plan allowed could be allocated to oak. In the early days (when dealing with just a few forests and faced with the necessity of proving that forestry was worth while) we were concerned to make the forest as remunerative as possible and more rather than less conifers coincided with that aim. Now I think we should revise our ideas. We have planted and are planting masses of conifers but our area of land available

and suitable for oak (and beech) is small. Broadleaved planting has come to appeal less and less to private owners and the onus for future supplies has correspondingly shifted to the Commission.

Procedure on the above lines would begin with an assessment of soils.

(2) The Thinning Treatment of the Existing Young Oak

The tendency, quite rightly in my view, is towards heavier thinning and the early selection and development of elite trees. This is quite in accordance with views which I have slowly formed by long-continued observations. At the same time there are always risks which cannot be foreseen, in proceeding to extremes. We ought to proceed experimentally to begin with, increasing the scale as we become surer of our ground.

"R"

January, 1951.

Conservator's Comments

1. I have made one or two marginal comments in the text but generally I feel that Mr. Troupe (District Officer) has given a very good picture and has clearly obtained his information as a result of considerable search. The following comments may, however, be of some value.

2. It seems all important to produce the best possible timber on any given area within, of course, certain reasonable expenditure. I have noticed in oak woods in this country the large amount of Stereum which has unnecessarily been allowed to develop and against which merchants make due allowance when tendering for any particular parcel.

It should be our endeavour in the future having, by good silviculture (including pruning), produced the necessary length of clean bole, to give the oak trees selected for the final crop plenty of room to develop maximum volume and avoid the subsequent dying of large branches. To this end the policy of selecting about 100 per acre of the best stems, reasonably spaced, has been instituted as a general practice. These stems will be marked and pruned and all thinning will be done in the future for their benefit.

3. Having considered some of the methods and the length of time allowed in Continental countries to produce natural regeneration in their forests I wonder if we, in this country, do not exhibit much too much impatience and expect our results too quickly. The destruction of vermin and the cultivation of the soil at the right time to receive the seed seem to be the two most important factors in natural regeneration.

It seems to me that we need, in talking about natural regeneration, to be sure we have got seed bearers of the correct type, and not only of the correct species for the site. It would be undesirable, for the sake of saving the trouble and expense of planting, to perpetuate an undesirable species or type.

4. Planting of oak. I have been considering this problem quite a lot and I can see very little reason for planting oak pure. There is very little to be got out of intermediate yields from oak whereas the intermediate yields from conifer are good. Hence it comes down to the desirability of establishing a final oak crop plus some extra for eventualities. Spacing of groups at 21 ft. (100 per acre) in a crop of Norway spruce or European larch might be a very satisfactory silvicultural solution but is, from the management point of view, most difficult in any species. Hence I would prefer say three rows of oak with four rows of the conifer. This will simplify management, give ample scope for selection and pruning of good type oak and mean that at the age of say 40 years the conifers could be harvested and give a good financial yield and the strips so formed be planted up with beech for soil improvement. The age of 40 years would need to be extended if the oak were not tall enough at that time. We would not want to have the oak interfered with later in life by the beech.

R. H. Smith

HISTORY OF ALICE HOLT FOREST

GENERAL DESCRIPTION OF THE FOREST

Name.

Several explanations of the derivation of the name have been given. The "Oxford Dictionary of English Place Names", quotes the form "Alfsiholt" as being current in 1169 and "Alfriesieholt" in 1242:- both of these signify "Aelfsige's Wood", Aelfsige being a common Old English name. The form "Aliceholt" occurs in the Bishop of Winchester's Pipe Roll for 1373. Alternatively it may be a corruption of Aler or Alder Holt.

Situation

The woods are situated at the eastern extremity of Hampshire bordering on the County of Surrey, about five miles south-west of Farnham. They form a fairly compact block consisting of seven inclosures.

Area and Utilization

The forest was acquired by the Forestry Commission from the Office of Woods in 1924. The total area transferred was 2153 acres, but these included 11 acres represented by public main roads through the forest, so that, in effect 2142 acres became Forestry Commission property.

At the time of the transfer, the area was constituted as follows :-

TABLE I

Lodges and cottages let for residential purposes		176
Land let for agricultural and other purposes		34
Land used for the growth of timber (including roads etc.)		1943
	Total	2153

The present utilisation of the 2142 acres which are actually at the disposal of the Forestry Commission, is as follows:

TABLE II

(a) Plantations -					
	Acquired	824			
	Formed by Commission	1070	...	...	1894 acres
(b) In hand, awaiting planting					
	Blanks after felling	40	...	...	40 "
(c) Nurseries	...	...	...	...	5 "
(d) Agricultural	Number of Tenancies	5	Area		152 "
(e) F.W.H.	Number	4	Area		19 "
(f) Unplantable land in hand (Pond)					7 "
(g) Other land					
	Research Station Environs	18			
	Forest Lodge	3			
	Allotments	4	...	...	25 "
				Total	2142 acres

Physiography

The forest may be compared to an oblong, measuring some $2\frac{1}{2}$ miles from north to south and about $1\frac{3}{4}$ miles from east to west. The northern half forms a plateau, with a maximum elevation of 450 ft. above sea level; towards the east, south and west, the land slopes away to about 230 ft. All slopes are gentle, and the main aspects are south, south-east and south-west. Exposure is nowhere severe. In the eastern part of the forest there are two streams, one in Glenbervie and one in Willows Green Inclosure; these flow from west to east. A third stream, flowing north-west to south-east, roughly separates the outlying Straits Inclosure (in the south-west) from the rest of the forest.

Geology and Soils

The soils at Alice Holt develop largely from Gault clay. This is a stiff, blue material, which, in its unweathered condition, possesses a good base status. Whilst unadulterated Gault is found in Straits Inclosure, in parts of Goose Green, and in localised patches elsewhere, the greater extent of the forest has an overlay of drift material. The Gault is

usually found a few feet below this drift, which consists of a flinty deposit, although to the east it becomes sandier in texture.

Gault is a Cretaceous formation, and it would appear that subsequent marine or estuarine conditions allowed it to be capped by drift material. At a still later stage, freshwater erosion carried away much of the drift, re-exposing the Gault in places. Areas such as Straits Inclosure, where no drift is found, may either have come under considerable pressure from this erosion - a pressure strong enough to remove all the deposit - or may, alternatively, have been beyond the reach of the drift-depositing agents.

Despite the good base content of unweathered Gault, a more or less acid surface soil is found everywhere. This is explained by the presence of the drift, which must have been subject to considerable leaching forces during its geological history, a leaching which continues to a lesser degree to the present day. The Gault still has a good base status: this is not surprising for water does not readily percolate through it.

Gault soils and the drift overlying suffer from impeded drainage. Gleying is general, and the more acid the surface conditions, the more pronounced it becomes. (The presence of calcium improves the texture of a soil by causing a sort of "flocculation": aeration is therefore improved and gleying cannot proceed so far). It has been suggested by Dr. Von Christen, who made a special study of impeded drainage here in 1952, that in the past the forest was capable of sustaining a more varied and exacting crop than is now possible. He deduces this from the decreasing base status of the soils, and concludes that only the application of lime would be effective in reversing the process. It must be said, however, that the choice of species will help to diminish leaching, for the root zones of deeply rooting species are not devoid of basic material: this may be transferred to the top soil in the leaf fall. Only deeply rooting species can do this effectively, but it is not an easy problem. It has been suggested that the shallow rooting Douglas fir produces a more basic litter than the deeply rooting Scots pine, on many sites. Yet where the surface soil is poor in bases, Douglas fir would probably produce an inferior leaf litter to that of Scots pine. Without detailed research, it is not possible

to be more dogmatic than this, but certain deductions are incorporated in the "Choice of Species" paragraph.

Apart from the chemical aspect of rooting, there is the physical. Deep rooting systems help to improve the aeration of soils. They also give the water channels down which to move, although they have no effect on percolation through the soil itself. Water becomes less liable to stand on the surface where a deep rooting system is found. Shallow rooting species suffer a disadvantage here: they are always subject to windthrow on impeded soils, and the formation of their roots is not calculated to help the downward percolation of water.

Vegetation

General

The vegetation may best be described under the three main soil types, as outlined in the preceding section. There is little doubt that the forest was covered with pedunculate oak from Atlantic times onwards (5500-2500 B.C.) and subsequent planting perpetuated the natural environment, for pedunculate oak was the only species commonly used. This policy began to change at the end of the nineteenth century, when these soils incapable of sustaining good oak were gradually replanted with conifers - a policy which continues to this day. This has led to modifications in the vegetation.

Clay Soils

Tree Layer. A number of species are associated with the older oak, though, with the exception of sweet chestnut, they rarely reach the upper canopy. Locally, where the soil is richer in bases, ash appears. On open sites sallow is quite common. Rowan and yew are infrequent, but sweet chestnut is fairly commonly seen. Field maple is occasionally found.

Shrub Layer. Species are few in number, but include hawthorn and dogwood - two species which are very common on this soil type. Hazel and blackthorn are frequent.

Field Layer. Blackberry is in abundance nearly everywhere. Other important species are honeysuckle, wild rose (Rosa canina) and ivy. Butcher's broom is found locally.

Dog's mercury appears (often with ash). Other notable species are Herb Robert, enchanter's nightshade, tufted hair grass (Deschampsia caespitosa) and Yorkshire fog (Holcus lanatus). Where the oak has been felled wild angelica is sometimes abundant. Under these conditions tufted hair grass increases in abundance, whilst other species, either absent from or uncommon in the oak wood appear, e.g. marsh thistle (Cirsium palustre), hedge bedstraw (Galium mollugo) and Juncus spp.

The mosses found are those associated with a fair base status: Eurhynchium praelongum, Eurhynchium striatum, Thuidium tamarascinum and Fissidens taxifolius.

Gravelly Drift Soils

Tree Layer. All the species occurring on clay soils are present, although field maple is much rarer. Yew, virtually absent on the clay is found locally and holly becomes fairly common. Regeneration of oak is not uncommon on suitable sites.

Shrub Layer. The species are much the same as on the clay, but with slight, though significant differences in relative abundance: the decrease of hawthorn, blackthorn and dogwood is perhaps the most salient feature.

Field Layer. Superficially this layer appears to be much the same as on clay, since blackberry is equally abundant. Honeysuckle is prominent, but wild rose (Rosa canina) is not quite so widespread. More significant is the occasional intrusion of bilberry and ling.

There is an increase in the incidence of the fern Dryopteris austriaca, of wood sage, wood spurge, common speedwell, Agrostis spp., creeping soft grass (Holcus mollis) and, on open sites, the common rush (Juncus conglomeratus). All these betoken, in varying degree, the more acid conditions. Dog's mercury and common nettle are generally absent. The most notable species, however, is bracken: except under the densest conifer shade, it is rarely absent.

The mosses are those associated with more or less acid conditions, i.e. Dicronella heteromalla, Dicranum scoparium, Polytrichum formosum and Mnium hornum.

Sandy Drift Soils

Tree Layer. Ash and field maple are absent and their place taken by species more suited to the soil. Birch, holly and mountain ash become more prominent. Oak exists only in small groups; elsewhere conifer plantations have taken its place.

Shrub Layer. The species here are very similar to those found on the gravelly drifts.

Field Layer. Blackberry is again notable. The most characteristic species is bilberry, which, where light is adequate, shares dominance with blackberry and bracken. Ling, Molinia and wiry hair grass (Deschampsia flexuosa) are also found on the ridesides, and in the more open plantations. Honeysuckle, Dryopteris austriaca, and heath bedstraw (Galium hercynicum) also occur.

In the mosses, those species characteristic of the clays are entirely absent, those present being typical of healthy conditions, i.e. Dicranella heteromalla, Dicranum scoparium, Plagiothecium denticulatum, and the widespread Lophocolea bidentata.

Summary. Blackberry is important on all three soil types. Two other species, not dominant on the clay, share dominance on the other soil types, they are bracken and honeysuckle.

The oak woods correspond to three types:-

(a) Damp oakwood on clay soil

(b) Poor damp oakwood on gravelly drift

(c) Poor dry oakwood on sandy drift (this category is almost absent, due to replanting with conifers).

Climate

The climate is comparatively mild and damp with a rainfall of about 30 in. fairly distributed over the year.

Risks

General. Many species are represented at Alice Holt, but the individual stands are quite small. This diversity, and avoidance of large blocks of a single species reduces the risks of wholesale damage.

Animals: Grey squirrels are fairly numerous, but the worst forms of their damage are avoided, since susceptible species such as beech and sycamore

are not general to the forest. They do, however, take acorns whether sown or otherwise and have, no doubt, contributed to the poverty of oak regeneration. Strong measures are taken to keep them in check; trapping and shooting have both been successful, and sectional aluminium poles have been used for poking dreys to good effect.

Rabbits are not common, and it is possible to plant over most of the area, without having recourse to wire netting.

Deer are rarely seen in the forest.

Moles and mice are sometimes a nuisance in the nurseries.

Birds: Pigeons and jays have, like the squirrel, taken sown acorns. Nesting boxes have been placed, by the Research Branch, in several localities, to encourage useful species.

Insects: The Oak Leaf Roller Moth (Tortrix viridana) is found in all the oak plantations. Hylobius, Pissodes and Myelophilus species are present, but damage has been slight.

The Pine Shoot Moth (Evetria buoliana) has caused the typical shoot "post horn" deformation of Scots pine, but only to a very minor degree. Sitka spruce (a tree quite unsuited to the forest) has suffered yearly attacks from Neomyzaphis. In this unfavourable habitat some of the spruce have died, but it would appear that the Aphis merely eliminated trees already sickly.

In the nursery chafer grubs have been locally troublesome, but trapping and digging have kept their damage to slight proportions. Douglas fir is as usual attacked by Adelges cooleyi.

Fungi: Larch canker (Dasyscypha calycina) is general on the younger European larch, but not to such an extent as the sickly growth of this tree would lead one to expect. Heart rot (Fomes annosus) and Honey fungus (Armillaria mellea) are not prominent. The latter disease has, however, attacked and killed Weymouth pine already weakened by Pine Blister Rust (Cronartium rubicola) and the insect Adelges strobi. Weymouth pine is quite definitely not a tree for planting in this forest.

Stereum species attack the oak, and enter particularly where branches, having formed heart wood, die back. This damaging disease is

being combatted by ensuring that such branches are either pruned or given room to develop as part of the crown of the tree. Here, as elsewhere, sessile oak is likely to be less liable to Stereum attack than pedunculate.

Weather: The clay soils are wet and cold in winter, but in summer they are liable to crack in prolonged drought. Although the rainfall, which is 25-30 in. fairly distributed over the year, is adequate, it must be remembered that the loss due to run off and evaporation is high on clay soils. Furthermore clay has a high retentive force and these soils which may seem moist are often physiologically dry, as far as the roots are concerned. In the case of oak and pine this does not signify greatly, but the failure of the spruce is no doubt connected with these phenomena. Douglas fir, although satisfactory, is limited to Quality Class III and this may be due in part to lack of available water.

Frost has been a serious factor on the lower ground, in the raising of oak. This has been especially noted in Straits Inclosure. A strip system of replanting was here instituted as explained elsewhere in the history. This has not entirely succeeded in its purpose, for the bushy form of repeatedly frosted oak is often to be seen. Coppicing may be one answer to the problem, or nursing with Scots pine another; both are being investigated.

Snow damage was very heavy in the winter of 1949-50: It was computed that some 40,000 larch had their tops broken in the unseasonable snow storm of April 1950: the trees had then flushed.

Shallow rooted species have been prone to windthrow. This has affected both Douglas fir and the spruces. There is no easy way out of this, for even good drainage is only a partial answer in clay soils.

Very careful thinning is the rule, and steps are taken to see that shallow rooted species are not deprived of adjacent cover. Wherever possible, deep rooted species are to be preferred.

Fire. The forest has several popular rights of way running through it, and its environs are much favoured by hikers and picnickers. It is furthermore much intersected by well-used main and secondary roads.

During fire danger periods it is necessary to be very vigilant. Although the hazard cannot be compared with that of, say, Bramshill, there are large areas of very valuable coniferous plantations which must be safeguarded. In this close-packed forest a fire, if it got out of control, could assume very large proportions.

A permanent mobile dam unit is stationed at the forest.

Roads

Externally the forest is well served by main and secondary council roads. So far as internal roads are concerned, only that between the Research Station and Bentley Station has been given full surfacing treatment. In most parts of the forest road work is not easy: hardcore is pressed down deep into the mud in wet weather, although bundles of fascines laid first help to arrest this. Excepting the more gravelly areas, the use of fascines is indeed essential: it is useless merely to spread hardcore . The expense necessary to make a hard road system has been a deterrent, but progress is being made in those sections where hardcore can be spread alone. Elsewhere local repairs to help extraction are the rule. It has been proved that large-diameter-wheeled trailers do much less damage to the rides, and these will be in general use in the future.

Labour

Labour is readily available in the area. There is a sound "backbone" of men who come from families having a long connection with forestry.

SILVICULTURE

Early History

Man has lived in the environs of the forest from Lower Palaeolithic times. He was attracted by the game, the timber for fuel and buildings and later by the Gault clay for pottery, brick and daub. Major A.G. Wade, M.C. has uncovered pottery from the Romane-British kilns dating back to the first century A.D. In addition Iron and Bronze Age implements have been found in the locality.

Alice Holt Woods are a detached part of the ancient Crown Forest of Woolmer. The earliest known survey was made in 1171 in the reign of Henry II. Another survey of 1635 gave details of the timber then growing in the forest and its value, together with a list of forest officers. The officers of

the forest were a Lieutenant, a Ranger, two Verderers, a Steward, two Woodwards, and five Foresters. An elaborate system for the preservation of "Vert and Venison" seems to have been evolved with the usual strict punishments for infringement of the Forest Laws. The principle interest in the survey lies in its description of the timber. It consisted mainly of oak together with some beech and ash; nearly all the stands are described as being "of full growth and decaying". Major Wade interprets this as indicating the age of the trees as about 900 years at that time, his theory being that the oak started to grow about A.D.500-600 soon after the Romans withdrew from Britain, and the devastation of the woods to provide fuel for pottery ceased. This must be regarded as inconclusive evidence, however, since many of the trees in Goose Green Inclosure now barely 130 years old could also be described as being "of full growth and decaying".

The woods seem to have been well looked after in the later part of the 17th Century, but, like other Crown woods, suffered a long period of neglect in the 18th century. The office of Keeper or Lieutenant of Woolmer Forest had been granted on lease for lives or terms of years, on conditions which, while bringing in little profit to the Crown, had reduced the forest to a bad state. The last lease was for a term which expired in 1811. In 1812 was passed an "Act for the better cultivation of Navy Timber in the Forest of Alice Holt"; under its authority the deer were removed and 1600 acres were inclosed by the Crown out of the waste of the forest which comprised some 2,400 acres. This area is held free from common and other rights, and may be used only for the growth of timber. The commoners were compensated by the surrender of the Crown rights over the remainder of the unenclosed forest. The 1,600 acres with existing crown freeholds to the extent of 296 acres, partly occupied by lodges etc., made the area of the Crown's estate 1,896 acres.

The 1,600 acres were planted with oak between 1815 and 1825 on the clearance of a matured crop of oak with some beech and ash, planted probably in the reign of Charles II. After this, thinnings were regular and heavy.

Recent History

In 1881 a beginning was made to clear away the poorer parts of the 1815-1825 oak crop, and between that date and 1903, about 50 acres were

cleared and replanted with conifer.

In 1903, Sir William Schlich compiled his working plan for the forest, his object being to clear the remaining areas of the poor oak and replant with conifers, and to regulate fellings over the rest of the area. The Plan classified the oak woods into three quality classes by height growth at eighty years of age as follows :-

1st class (mean height 60 ft. and over)	... ...	315 acres
2nd class (mean height 40-60 ft.)	... ...	1,146 acres
3rd class (mean height under 40 ft.)	... ...	331 acres

There were also 31 acres of coppice and 61 acres of coniferous plantations.

Prescription of the Schlich Working Plan

The Plan divided the forest into three working circles, the oak, conifer and the amenity working circles. The Oak Working Circle consisting only of the first class oak was to be thinned and underplanted with beech at the rate of 15 acres per year. The Conifer Working Circle was to be cleared of oak and replanted with conifers at the rate of 15 acres, each year for 20 years, and thereafter at 21 acres each year over the following 40 years. The Amenity Working Circle (the Lodge Inclosure) was to be managed on a system of selection fellings to maintain the amenities of Alice Holt Lodge.

By 1913, 117 acres of poor oak had been cut and replanted with conifers, chiefly Scots pine with a little larch, but no underplanting of oak and beech had been undertaken.

In 1918 the then Mr. R. L. Robinson inspected Alice Holt Forest and made certain recommendations for a revision of the Schlich Plan. His report is attached as Appendix III to this history. In 1924 the Forestry Commission took over the forest, and the revised allocation of working circles was laid down as follows :-

Oak W.C.	... ...	600 acres
Conifer W.C.	... ...	1,180 "
Amenity W.C.	... ...	147 "

The annual falls were laid down as :-

Oak W.C.	... ...	10 acres
Conifer W.C.	... ...	30 "
Amenity W.C.	... ...	3 "

The present state of the three circles is as under :-

Circle	Total Acreage	Regenerated	Mature or Middle-Age
Oak	600	191	409
Conifer	1,180	653	527
Amenity	147	40	107
	1,927		

During the war of 1939-1945 the earlier policy of replanting poor oak areas with conifer paid handsome dividends: 140 acres of young conifers were clear felled for pitprop production, and a further 108 acres were thinned; 134 acres of hardwood were also felled, and the total production amounted to:-

Mature Conifers	44,000	cu.ft.	(Mainly saw timber)
Young Conifers	333,000	"	(" pitwood timber)
Mature Hardwoods	360,000	"	(" saw timber)
Coppice Hardwoods	10,000	"	(" pitwood timber)
Total:	747,000	"	

Replanting to repair these clearances of timber has been completed.

Choice of Species

The impeded soils of Alice Holt demand a special study, in order to find the species best suited to these conditions. The Schlich Working Plan of 1903 laid down that the areas of poor oak were to be felled gradually and replaced by conifers, principally Norway spruce. This policy has been followed but Norway spruce has not been used to the extent envisaged: Scots and Corsican pines have been predominant together with Douglas fir and European larch.

Soils which will grow good oak remain, and will remain under oak. These soils are those which have little or no gravel admixture i.e. almost pure Gault clay. Different prescriptions are required for the rest of the area and some of the considerations affecting choice of species follow:-

(a) The soil is comparatively rich and justifies the use on this ground of high volume producers.

(b) Impeded drainage aggravates windthrow. Shallow-rooted species therefore suffer a disadvantage.

(c) Shallow-rooted species are also ecologically unsound since they rob the top soil, and deposit an acid litter which causes further soil deterioration.

(d) Deep-rooted species improve drainage and aeration. Their roots may reach to the basic material in the soil, and their leaf fall improve the basic status of the upper soil, and hence the structure of the upper soil.

Bearing in mind these considerations the species most suited to the different soil types will be discussed.

Pure Gault Oak has proved to be the most suitable species here. Schlich's quality Class I oak all lies upon soils which are pure, or nearly pure Gault. Oak deteriorates on the drift soils. Scots pine is likely to do quite well, and may have a useful function in nursing the oak. Frost is a factor to be considered in raising oak at Alice Holt.

Drift Capped Soils These soils differ in texture and can be divided into two main groups - gravelly drift and sandy drift.

(i) Gravels These soils have impeded drainage, acid top soil and comparatively poor base status below this: the underlying gault clay is still rich in bases and lies about 3 ft. below the surface. It is ecologically unsound to plant shallow-rooted species on such a soil, for, wind-throw danger apart, they lead to a further deterioration in soil conditions. Exceptions can and have been made, where the soil is richer: here Douglas fir will grow quite well producing Quality Class III trees. It is clear that Douglas fir should be confined to sheltered localities having better soil than is general. Other shallow-rooted species e.g. Norway spruce and Sitka spruce cannot be recommended; both have been planted with generally poor results.

Deep-rooted species should be the rule and Corsican pine and Scots pine stand out as the most successful species so far tried. The former is especially good, but both produce Quality Class I trees. On the evidence of one of the species plots in Glenbervie Inclosure, Thuya plicata is a very suitable tree which

appears to have a better root system than that of Douglas fir. European larch and Japanese larch are generally poor; doubtless the poorly aerated soil is not to their liking. Tsuga is represented by small plantations about 7 years old. Their growth has been excellent where side or overhead shelter has been available. This is likely to prove a good tree on the gravel drifts, but further observations are needed, and research into the depth of the root zone would be useful.

(ii) Sandy Soils These soils occur along the east and north-east boundary of the forest near where the Lower Greensand appears. Corsican pine is undoubtedly the best species to plant here, although Scots pine also does extremely well.

Except for some 20 acres of conifer, all mature timber is oak. Other than in parts of Lodge and Straits Inclosure, the oak is generally not of good quality and shows dying back in many areas.

Species planted at Alice Holt are mainly oak in the Oak Working Circle with some sycamore and ash. Oak and sycamore form the chief species in the Amenity Working Circle though beech, ash, hornbeam and Douglas fir are also present.

The main coniferous species planted have been Scots pine, European larch, Corsican pine and Douglas fir with a certain amount of Japanese larch, Sitka spruce and Norway spruce and experimental plots of Thuya, Weymouth pine and blue Douglas fir. Since the war some Abies grandis, Picea Omorika and Tsuga heterophylla have been planted. The main lay out of species for the conifer Working Circle is Douglas fir on the lower slopes having better soil with Corsican pine on the higher gravel soils. Other conifers can be used to a limited extent, Thuya in particular deserving consideration in view of its good growth in the experimental plot and value for ladder poles.

Although many conifer species have been tried and most of them will grow there are few that do really well. Scots pine is somewhat coarse growing and the soil justifies a higher volume producer; European larch is by no means always healthy, Norway spruce has been disappointing and Sitka spruce is liable to suffer severely from frost and Aphis and the rainfall is too low. Japanese larch grows well in the early stages but

falls off in height growth later. Douglas fir is slow growing judged by west country standards but none the less gives a high volume yield and has so far proved a satisfactory tree. Corsican pine seems entirely suitable to the lighter soils. Other Western American species, Thuya, Lawson cypress, Tsuga, Abies grandis are difficult to establish in dry seasons owing to the tendency of the soil to crack.

Natural regeneration and planting

Natural regeneration of oak has rarely been possible on account of pigeons, squirrels, Tortrix and weed growth. The good seed year of 1913-1914 did, however, result in a good natural group in Compartment 75 of Abbots Wood Inclosure. There is also an excellent group of regeneration in Compartment 34, of Lodge Inclosure as a result of clear felling during the seed year of 1945. In 1950 it was noted that many of the mature oak groups left in Compartment 34 of Lodge Inclosure had a fair head of acorns, and mechanical scarification of the soil was undertaken beneath these groups in order to encourage regeneration. A rotavator was used for this purpose, preceded by weed clearance using an Allen autoscythe.

Both Compartments 34 and 35 are a part of the Amenity Working Circle. Here planting has been done on a group system to preserve the amenity of the area, and also to secure protection from wind, sun and frost. Groups, some $1\frac{1}{2}$ chains in diameter, and about 2 chains apart were cleared intermittently in the old oak from 1922 to 1938, and planted with oak, ash, beech, norway maple, copper beech, hornbeam or sycamore. After six to fifteen years some of the groups were enlarged or extended to join up with adjacent groups. Since the gradual extension of individual groups is troublesome and complicates extraction, the policy was changed, the intention being to coalesce all the central groups into one large group.

Accordingly in 1945, the central groups of Compartments 33 and 34 were joined by felling all the old trees. This coincided with a mast year and resulted in the 5 acres of natural regeneration in Compartment 34, already mentioned. By 1949 further sporadic regeneration was obtained and many of the older groups were in need of more light. The remaining trees were all felled in the winter of 1949-50 in these two compartments. Compartment 33 was replanted with 1-year old seedlings and Compartment 34 was sown with acorns. In the latter case, late sowing combined with the

attacks of vermin have made for a rather uneven "take".

In the Straits Inclosure strip planting was undertaken in order to give protection to the planted oak and ash, for similar reasons to the choice of a group system in the Amenity Working Circle. Here, strips $\frac{1}{2}$ chain wide were cut through the old oak, leaving intervening $1\frac{1}{2}$ chain belts. To avoid any sudden opening up, the remaining oak belts are removed in two fellings, so the whole regeneration involves three main fellings. The first fellings and plantings took place from 1920 onwards, and the secondary fellings from 1934 until their completion in 1943. The strips have been cut from north-west to south-east although the Chairman has since observed that it would have been preferable to cut them from east to west in order to avoid quick thawing, in a locality where frost is troublesome. It is significant that many of the best oak in the planted strips are of coppice origin:- these appear to stem from young naturally regenerated oak, cut over when the ground was being prepared for planting, and probably further cut over in weeding operations. It has now been decided to preserve coppice shoots in future planting, introducing oak between stools. The coppice will help to nurse up the young oak, and whilst most of it will be cut out in thinnings, a proportion should go on to maturity.

RESEARCH - Notes on the Experiments at Alice Holt Forest (excluding Sample Plots)

Introduction

The experiments dealing with the establishment of oak are mostly situated in the Straits Inclosure. The area is almost flat with an elevation of about 250 ft. and is very subject to severe late frosts. The soil is heavy and drainage difficult.

When the woods were originally planted there was a very complete and elaborate system of drains but the labour problem over the years has made it impracticable to retain more than the most essential drains and water-logging may well be the cause of the dying back of many trees in the old oak crop.

The strip in which most of the experiments are situated was felled in 1925 but not replanted until 1927.

Up to that time the existing young oak plantations had shown little promise, most of the plants being bushy and slow growing.

This poor growth was considered to be due to the combination of a number of factors of which frost, cold wet soil, and weed competition were perhaps the main causes.

Experimental Treatments

The experiments carried out in P.27 were laid down with these points in view and the main treatments were as follows:-

(1) Hoeing versus normal hook weeding.

(2) Planting on ridges versus planting on the flat.

(3) The comparison of seedlings versus transplants.

(4) Bunch planting versus single tree planting.

(5) Various spacings at the time of planting.

(6) Trial of various nurse species for oak.

In P.30 two further experiments were carried out dealing with

(1) Degree of weeding of oak.

(2) Group planting compared with group sowing in a Eurpoean larch matrix with alder nurses.

There are only two later experiments in the Straits both in P.44

(1) Underplanting standing oak with oak.

(2) Surface mulching newly planted oak with raw oak leaves and humus.

In Lodge Inclosure there are four more experiments as follows:-

(1) Heavy dressings of oak leaves and humus applied both as a top dressing and mixed in the soil at the time of planting the oak seedlings (P.45).

(2) Two experiments on degree of weeding of oak (P.48).

(3) An experiment designed to test the effect of giving dominant young oaks free growing space so that a full crown may be developed from an early age.

The latest experiment is in Cottons Copse and deals with the question of the establishment of poplars.

Summary of Results

(1) Hoeing versus normal weeding

In three experiments this treatment was tried for the first two or three seasons after planting. It gave no appreciable advantage over normal

weeding and owing to its high cost was discontinued.

(2) Planting on ridges compared with normal flat planting

Small continuous trenches one spit deep were dug and the oak seedlings notched into the ridge formed by the turned out soil.

Here again the expensive special method gave no better results than - normal notch planting.

(3) Comparison of seedlings versus transplants

As elsewhere, the seedlings gave slightly better height growth and an equally good stocking so in view of the saving in nursery expenses there seems to be everything to be said in their favour.

(4) Spacing and arrangement in plantation

(a) Bunch planting. Here there were three treatments as follows:-

A. Single plants (4 ft. x 2 ft. spacing)

B. Bunches of 6 at each planting point. (planting points 5 ft. x 4 ft.)

C. " " 3 " " " " " " "

Bunch planting has shown up relatively well, more particularly as regards distribution of Class I stems*. There is a decided (but doubtfully economic) advantage in the bunches over single plantings but there is no commensurate advantage in increasing the number in the bunch from three to six.

Treatments	Class I No. of stems per acre at 20 yrs.	Class II stems	Mean Ht. after 16 yrs.
A. Single plants at 4 ft. x 2 ft.	239	111	11.6 ft.
B. Bunches of 6	234	219	11.9 ft.
C. " " 3	226	192	12.0 ft.

(b) Spacing of single plants

At Alice Holt we have no wide spacings other than the bunch, plantings mentioned above. We can only compare 4 ft. x 1 ft., 3 ft. x 2 ft., 4 ft. x 2 ft., and 4 ft. x 3 ft.

* Trees of best form, with continuing main axis and straight stem.

It is quite clear that the 4 ft. x 1 ft. and 3 ft. x 2 ft. spacings are definitely wasteful and give no better result to compensate for the extra plants used and extra work involved. 3 ft. x 2 ft. had the added disadvantage that it is difficult to weed without cutting off young plants.

The 4 ft. x 3 ft. spacing at 20 years gives us 310 Class I trees per acre, a very satisfactory figure, though it should be noted that in some other forests the figure for this spacing goes as low as 106 Class I per acre.

The 4 ft. x 2 ft. spacing gives the very high average of 478 Class I trees per acre.

These figures are the more remarkable when it is borne in mind that all these plots suffered repeated severe frost damage during the first 10 years of their life.

It seems reasonable to assume that in this forest an even wider spacing than 4 ft. x 3 ft. would have been successful given a good strain of oak and adequate weeding.

(5) Nursing of Oak

(a) Line and intimate mixtures. (Experiment 5. P.27)

Treatments as follows:-

A. Norway spruce and oak alternate lines spacing 4 ft. x $4\frac{1}{2}$ ft.

B. Sitka spruce " " " " " "

C. Grey alder " " " " " 4 ft. x 4 ft.

D. European larch and oak. 1 row larch - 2 rows oak. Rows 4 ft. apart. Larch 6 ft. and oak 3 ft. apart in the rows.

E. Norway spruce and oak alternate plants 4 ft. x $4\frac{1}{2}$ ft.

The management of the nurse crops proved very difficult and the following points may be observed:-

(1) The one row larch, two rows oak was the only treatment at all satisfactory mainly because with two rows the oak had a greater chance of avoiding suppression.

(2) After 20 years the adjacent pure oak is equal in height to the best nursed oak, but the mean girth of the nursed oak was increased by 2.8 in. owing to the larger crowns developed after the removal of the nurse species.

(3) The Norway spruce, Sitka spruce and alder grew too fast for the oak and owing to the intimate form of mixture they all had to be cut out before reaching economic size (except for the sale of Norway spruce Christmas trees).

(4) The European larch - oak mixture gave 204 Class I oak trees per acre against less than 100 in the other mixtures and over 400 in the pure oak.

(b) Group planting by sowings and seedlings with alder nurses in a matrix of European larch.

Experiment 8. P.30.

This experiment is divided into two blocks, each of 1 acre; one was carried out by direct sowing and the other by planting one year seedlings.

The oak groups are 6 ft. square, spaced at 21 ft. apart centre to centre and each had 4 alder planted round it (one on each side).

The European larch matrix consists of 2 rows of plants between the oak group rows and 2 plants between each pair of groups.

The oak seedlings were put in at 36 plants per group and the sowings at 3 lb. of acorns per group.

Several points emerge from this experiment:-

(1) The alder nurses proved too vigorous and had to be cut out at an early age.

(2) Owing to rodents and pigeons the sowings were only partially successful but it should be made clear that in areas where these pests were less numerous very good results have been obtained from sowings.

The groups planted with seedlings were very successful.

(3) The European larch made a poor start but after 20 years and two thinnings there are still approximately 400 to the acre. Further thinnings will be necessary but it appears that a fair proportion may reach saw timber size and even the early thinnings were saleable.

From these experiments it may be deduced that single line mixtures employed to nurse oak are unlikely to be successful. If three rows of the nurse species are used or if a group system is employed it allows much greater elasticity of management and many of the nurse trees may reach economic dimensions before they need to be cut out.

On this site and soil it is doubtful if a nurse crop gives any

advantage at all other than possible intermediate yields.

Degree of weeding of oak

The P.30 experiment was not a satisfactory one and only showed that the non-weeding treatment was disastrous where chestnut, hazel, sallow and blackthorn were left unchecked.

The new experiments laid down in P.48 are too young to give any results yet.

Underplanting standing Oak with Oak.

This experiment was intended to test whether the long period of weeding necessary on planting oak on a clear felled site might be avoided by introducing the new crop beneath the old one after a heavy thinning.

After six years the results are disappointing and it would appear that the initial thinning was probably not heavy enough to give the young plants enough light.

Surface mulching newly planted Oak with raw Oak leaf humus

The mulching reduced losses from 23% to 14% but has had no effect on height growth. It must be stated, however, that it proved very difficult to hold the mulch on the surface and much of it was lost during dry windy spells.

Heavy dressings of raw Oak humus both as a top dressing and incorporated in the soil at the time of planting oak seedlings.

Six treatments as follows:-

A. Control.

B. 12 in. of soil removed in three 4 in. layers from a patch approximately 1 ft. square and the soil returned keeping the layers approximately in their original positions.

C. As B but a 4 in. layer of oak humus packed at the bottom of the hole before returning the top 8 in. of soil. The bottom 4 in. soil layer discarded.

D. As for C but the oak humus mixed with the top 8 in. of soil before returning to pit.

E. As for B but 4 in. layer of oak humus applied as a top dressing.

F. As A but humus applied as in E.

This experiment was repeated at Buriton with beech and at Rockingham with oak and strange to say Alice Holt is the only site where none of the treatments has given any significant result.

This may be because the soil is decidedly good in this part of Lodge Inclosure and therefore the control plants do unusually well.

At the other two sites the mixing of humus with the soil (Treatment D) has been decidedly beneficial.

Notes on permanent samples plots in Alice Holt Forest

There are three groups of permanent sample plots in Alice Holt Forest.

(a) The species plots in Compartment 53, Glenbervie Inclosure.

(b) The Corsican pine and Scots pine in Compartment 49, Glenbervie Inclosure.

(c) The Douglas fir plot in Compartment 33, Lodge Inclosure.

The first permanent sample plots to be established at Alice Holt are situated in Glenbervie Inclosure, about half a mile to the south west of Rowledge. The elevation is about 330 ft. and the ground slopes gently to the south and south-east. Immediately to the north and north-west, at a slightly higher elevation, there is a fairly extensive area of level ground, while to the east the ground rises in the direction of Rowledge. Thus, the plots are sheltered by the configuration of the ground to the east, north-east, north, north-west, and, until the recent war fellings, were sheltered on all sides except the south-east by forest growth. The prevailing wind is south-westerly.

The soil generally is a grey clay, or a heavy clay loam, with pebbles and flints over stiff yellow clay to an indefinite depth. The geological formation is Gault, but the site is approaching the junction of the Lower Greensand. Where light conditions permit, the vegetation is typical of oak woodland on heavy soil. The following are among the principal species; Rubus fruticosus, Pteris aquilina, Rosa canina, Lonicera periclymenum, Teucrium scorodonia, Viola canina, Hypericum sp., Oxalis acetosella; grasses and mosses are not very abundant. There are some underwood species such as holly, sallow, blackthorn, hawthorn, hazel, and sweet chestnut. Natural seedlings of Thuya, Japanese larch, and Weymouth pine occur.

A series of tree species plots was laid down in 1906, and in 1927 permanent forest sample plots were established in Japanese larch

(Larix leptolepis), Western red cedar (Thuya plicata), Weymouth pine (Pinus strobus), and in Douglas fir (Pseudotsuga douglasii); in 1937 a further sample plot was established in Sitka spruce (Picea sitchensis). Other species plots present are blue or Colorado Douglas fir, Corsican pine and European larch. The plots were last measured in March 1943, and the following table gives a summary of the measurements:

Species	Japanese larch	Thuya	Weymouth pine	Douglas fir	Sitka Spruce
Quality Class	II	-		Below IV	-
Thinning Grade	D	C(1937) Previously B	C/D (1940) Previously C	C	C
Age	37	37	37	37	37
No. of trees per acre.	133	419	230	352	364
Top height (ft.)	50½	52	49	68	67
Mean height (ft.)	50	49½	47	64	62
Form factor	.383	.391	.450	.405	.460
True Girth at 4 ft. 3 in. (inches)	23½	25½	26½	28	23½
Basal area(sq.ft.)	32.2	117.7	71.2	121.6	88.0
Volume underbark (hoppus ft.)	617	2281	1507	3143	2519
Crown %	-	53	-	44	41½
Bark %	-	12	-	12	10
Total Thinnings Yield					
No. of trees per acre	1378	1413	2076	1630	612 ⁑
Basal area(sq.ft.)	121.1	114.3	181.3	104.5	55.5 ⁑
Volume underbark (hoppus ft.)	1727	1622	2645	1404	1032 ⁑
Total crop yield					
Basal area(sq.ft.)	127.4	243.2	252.5	226.1	143.5 ⁑
Volume underbark (hoppus ft.)	1973	3903	4152	4574	3551 ⁑
Current Mean Annual Increment					
Basal area(sq.ft.)	1.5	3.8	4.0	5.5	3.6 ⁑
Volume underbark (hoppus ft.)	30	147	117	243	181

⁑ These figures do not include early thinnings carried out before sample plot was established; it would appear that about 200 stems per acre were removed in these operations.

The Japanese larch plot was heavily thinned in 1937 with the intention of underplanting with beech; this operation was carried out during the following winter. Initial failures were extremely heavy owing to drought; replanting was carried out in March 1940. As a result of the opening up of the canopy, weed growth has been heavy.

The Weymouth pine plot has been subject to depredations by pine blister rust (Cronartium ribicola), Chermes (Adelges strobi) which is still evident on the stems, and honey fungus (Armillaria mellea) which is recorded as having killed several trees at the southern end of the plot. Many large gaps have been caused, and some trees appear to be still dying. In view of the open stocking and the uncertainty of the present crop, underplanting with western hemlock (Tsuga heterophylla) was carried out in March 1940; this was beaten up and extended two years later.

The Thuya plot is of special interest in view of the fine stems, and there is abundant natural regeneration in and around the plot.

Unfortunately, as a result of exposure caused by war fellings on adjacent ground, a gale in the early spring of 1943 blew down about 50% of the trees in the Sitka spruce plot, and it would not be surprising if the remainder of the plot were to be blown likewise.

The Douglas fir plot also suffered wind blow at the same time but to a much lesser extent, ten trees of the actual plot being blown as well as many at the southern end of the plot surround.

In 1949, two additional plots were established near the series laid down in 1927, and on similar soil and vegetation. These plots were in Corsican pine and Scots pine, both aged 64 years. On establishment, both crops were underthinned and the canopy was opened up gradually. There was, however, only slow response from the crowns of these trees. The following table gives a summary of the measurements at establishment.

Species	Corsican pine	Scots pine
Quality class	I	I
Thinning grade	C/D	C/D
Age	64	64
No. of trees per acre	120	172
Top height (ft.)	98	83
Mean height (ft.)	96½	81½

	Corsican pine	Scots pine
Form factor	.389	.404
True Girth at 4 ft. 3 in. (inches)	48½	39½
Basal area (sq. ft.)	122.8	117.4
Volume underbark (hoppus ft.)	4623	3871
Crown %	34½	32½
Bark %	18½	12
Total thinnings yield		
No. of trees per acre	29 ⁑	24 ⁑
Basal area (sq. ft.)	19.2 ⁑	15.0 ⁑
Volume underbark (hoppus ft.)	690 ⁑	507 ⁑
Total crop yield		
Basal area (sq. ft.)	138.0 ⁑	132.4 ⁑
Volume underbark (hoppus ft.)	5160 ⁑	4378 ⁑

Also in 1949, a single plot of Douglas fir was established in a crop planted in P.22, in Lodge Inclosure, near the arable nursery. The elevation is approximately 390 ft. and the plot occurs on the flat top of a plateau and is fully sheltered by surrounding plantations. The soil and vegetation are the same as at Glenbervie Inclosure. Before the Douglas fir was planted, the area carried a crop of oak standards. The following table gives a summary of the measurements taken so far :-

Species	Douglas fir
Quality class	II
Thinning grade	C/D
Age	21
No. of trees per acre	493
Top Height (ft.)	45
Mean height (ft.)	42½
Form factor	.382
True Girth at 4 ft. 3 in. (inches)	20
Basal area (sq. ft.)	84.1
Volume underbark (hoppus ft.)	1358
Crown %	57½
Bark %	12½

⁑ These figures do not include early thinnings carried out before sample plot was established.

	Douglas Fir
Total thinnings yield	
No. of trees per acre	370
Basal area (sq. ft.)	16.5
Volume underbark (hoppus ft.)	141
Total crop yield	
Basal area (sq. ft.)	100.6
Volume underbark (hoppus ft.)	1499

The plot was damaged by the snow storm on April 25-26th 1950, and several trees had to be removed. Consequently, there are several gaps in the plantation, especially near the south-west corner.

A plot has also been established in a small stand of hornbeam, but the crop is too small as yet for measurement of anything except thinning volumes.

APPENDIX I

Notes from Selected Inspection Reports

Date	Inspecting Officers	
May 1922	Technical Commissioner	Mr. R. L. Robinson
9.2.25	Technical Commissioner	Mr. R. L. Robinson
5.1.27	Technical Commissioner	Mr. R. L. Robinson
8.6.27	Technical Commissioner	Mr. R. L. Robinson
27.9.28	Technical Commissioner	Sir John Stirling-Maxwell
22.10.29	Technical Commissioner	Mr. R. L. Robinson
18.10.30	Chairman	Sir John Stirling-Maxwell
19.3.33	Chairman	Sir Roy Robinson
9.2.34	Assistant Commissioner	
28.10.38	The Chairman	
29. 4.41	Assistant Commissioner	Mr. A. P. Long
9. 5.41	The Chairman	
30.12.41	Assistant Commissioner	Mr. A. P. Long
27. 6.42	The Chairman	
16.10.42	The Chairman	
20. 3.43	The Chairman	
6. 1.45	The Chairman	
17. 2.45	The Chairman	
13.10.45	The Chairman	
23. 3.46	The Chairman	
12.10.46	The Chairman	
22.10.46	Conservator	Mr. F. C. Best
5. 6.47	Divisional Officer	Mr. R. H. Smith
5. 9.47	Divisional Officer	Mr. R. H. Smith
18.12.48	The Chairman	
4.10.49	The Conservator	Mr. R. H. Smith
16. 5.50	(The Conservator, State Forests	Mr. G. Batters
	(The Conservator S.E. (E)	Mr. R. H. Smith
22.9.50	The Conservator	Mr. R. H. Smith

28.10.38

The Chairman laid down that future strip fellings in Straits Inclosure would not be designed to cut out the whole length of a strip, since this led to undesirable exposure. Half the length of a strip between cross rides was to be felled at one time. The cuts in the different strips were to be staggered, thus forming a chequered pattern of shelter. It was agreed that the time had now come for the removal of as much old oak as was consistent with the retention of sufficient shelter for the young crop. In Lodge Inclosure, the Chairman thought that there was a tendency to put in an undue preponderance of sycamore in the past. He considered that there would be no objection to introducing some larch groups and would like to see further beech groups made. He did not consider that any more hornbeam should be planted. In general he noted a steady improvement in the forest; this he attributed to patience with the hardwoods and systematic thinning in the conifer.

29.4.41

It was observed that some of the strips in Straits Inclosure had apparently formed "frost pockets" - a danger they were designed to avert. Possible clear felling, and planting 10 acre blocks would have been preferable.

In Abbots Wood, the planting of European larch was deprecated, whilst in Glenbervie Inclosure it was noted that though Thuya regenerated freely, little came of the young growth. The selection of species for replanting in the Conifer Working Circle was discussed, and it was decided that pine would be used on the higher, more exposed and sandy areas, Douglas fir on frost free slopes where soil conditions are favourable, and spruce in the valley bottoms and moist hollows. Corsican pine is preferable to Scots pine. Douglas fir is preferred to larch owing to higher volume production and Norway spruce is preferable to Sitka spruce.

9.5.41

The general position was satisfactory. It was noted that the young oak in the Straits continued to make good progress, the vacillating weeding policy in the earlier years being the cause of most of the trouble. If the strips had run east to west there would have been better protection against frost (quick thawing out from the morning sun).

30.12.41

It was emphasized that the thinning programme should be accelerated to provide additional produce.

27.6.42

The Chairman indicated the desirability of extending the groups in the centre of Compartments 33, 34 of the Amenity Working Circle. Future extraction routes should be considered when extending these groups.

16.10.42

The house and gardens of Alice Holt Lodge were inspected with a view to their possible use as a forest research station after the war. A survey of the 1906 plots in Glenbervie inclosure led to the conclusion that the best species for Alice Holt were (1) Corsican pine, (2) Green Douglas fir, (3) Thuya plicata.

20.3.43

It was recognised that Corsican pine was the best tree for the higher gravel grounds. The lower heavy soils should be capable of growing oak, but where conifers are used Douglas fir has so far shown most promise. The Chairman considered that more Thuya might be planted.

6.1.45

It was recorded that when the end of wartime felling was in sight, a revision of the working plan would be required.

13.10.45

In Straits Inclosure a P.38 oak strip, which had not been weeded since P.42, was inspected. It was thought that on this plots' showing pre-war weeding had been needlessly prolonged.

12.10.46

It was confirmed that the Research Branch would occupy Alice Holt Lodge. A mulching experiment set up in Lodge Inclosure to show the effects of incorporating leaves into the soil was inspected. Whilst it appeared that a stronger root system was developed, further assessments would be needed before conclusive evidence was available.

22.10.46

Several less common conifer species were to be planted in Compartment 23 and the naturally occurring groups of Scots pine left.

5.6.47

The necessity for removing wolves in the oak groups in Lodge Inclosure was noted, but heavy thinnings must not be attempted.

5.9.47

In thinning hardwood groups in Lodge Inclosure, the policy of first marking final crop trees was to be adopted.

4.10.49

It was seen that the preparation of ground for planting was proceeding prior to felling. It was cheaper to prepare ground in advance of felling, rather than have to deal with the tangle of thorn and coppice which would be left if the merchant went in first.

16.5.50

The heavy snow damage in the larch plantations was seen. This was the result of the unseasonable storms on 25/26 April 1950. In Compartment 63, little difference was observable between P.10 and P.20 Japanese larch. It was thought that underplanting would not be successful, and that thinning at two yearly intervals might be the best course.

22.9.50

It was decided that oak though costly to raise, should remain the principle species in Straits Inclosure. In future planting there, full advantage should be taken of coppice growth from the stools of the previous crop, to nurse the planted crop. For comparative purposes a plot should be planted with Scots pine. It was decided to undertake experiments in the early coppicing of planted oak.

APPENDIX II

Supervision

Conservators

1946 - 1947	F. C. Best
1947 - 1949	A. L. Felton
1949 - to date	R. H. Smith

Divisional Officers

1924 - 1926	W. H. Guillebaud
1926 - 1939	A. L. Felton
1939 - 1946	F. C. Best
1947 - 1948	R. H. Smith

State Forests Officer

1948 to date	J. M. Ross

District Officers

1912 - 1919	G. H. Crossfield
- 1932	R. G. Forbes
1932 - 1939	G. Lowe
1939 - 1940	C. Barrington
1940 - 1942	T. Clear
1942 - 1944	C.H.R. Hillman
1944 - 1946	J. M. Ross
1946 - 1950	A. R. Sutton
1950 to date	L. C. Troupe

Foresters

- 1933	A. Simpson
1933 - 1940	A. W. Wallington
1940 - 1943	J.H. Cooper (Foreman i/c)
1943 to date	T. Aston

APPENDIX III

Recommendation for a Revision of Schlich's Working Plan

I inspected the Alice Holt Woods with Mr. Crosfield on 1st and 2nd June, 1918, with the following objects in view, viz. to determine:-

1. What fellings to make in order to meet demands for oak timber by the Timber Supply Department.

2. What revision of Sir William Schlich's Working Plan is necessary.

3. How best to fit in such fellings with a revised Working Plan.

Sir William Schlich's Working Plan

Sir William Schlich divided the oak woods into three classes, viz: 1st, 2nd and 3rd, which were mapped on a 6 in. plan.

(1) He prescribed the felling and replanting with conifers of 15 acres of part of the 2nd and the 3rd class oak.

(2) Thinning and underplanting of the 1st class oak at the rate of 15 acres per annum.

(3) Treatment of the Lodge Inclosure on the selection system.

Work done under the Plan

The only part of this work which has been systematically carried out is cutting and replanting of the 2nd and 3rd class oak. I have pointed out in a previous memorandum that a beginning should be made to regenerate the 1st class oak woods in order to break up the age classes. An opportunity has now arisen to do so as practically the only timber of any use to the Timber Supply Department is the oak in these woods.

I am doubtful whether the failure to underplant the better oak woods is any disadvantage under the particular circumstances which have arisen

but it is clear that the Lodge Inclosure should not be left without treatment. The woods have a considerable amenity value, but even in 1905 the timber was valued at £18,000 and this is a considerable sum to lock up.

Proposed Revision of Plan

I propose, therefore, to revise the plan on the following lines:-

Sub-Division of the Forest

1. The whole forest to be divided up into compartments, in conformity with our general procedure in the Crown Forests.

I have done this on the plan and have outlined 79 compartments numbered serially through the 6 Inclosures.

2. Three working circles to be constituted and subjected to separate and appropriate treatment:-

(a) Selection Circle: (Part Lodge Inclosure). Comprising Compartments 33, 34, 35, 36, 37 and 38, aggregating 132 acres, and so situated as to form a broad belt round Alice Holt Lodge.

(b) Oak Circle, comprising the whole of Straits Inclosure (Compartments 1 to 13 inclusive) 236 acres; Compartments 14 to 20 inclusive in Goose Green Inclosure 152 acres; Compartments 75 to 78 inclusive in Abbott's Wood 75 acres; Compartments 26, 27, 29 and 28 in Lodge Inclosure 73 acres; total for the Oak Circle 600 acres, of which 64 acres still remain to be selected.

(c) Conifer Working Circle, comprising the remaining compartments not included in the Selection Circle or the Oak Circle. The area is approximately 1164 acres.

Proposed Prescription of Plan

(The felling areas given below, unless specifically stated to the contrary are for the 10 year period of the revised plan).

Selection Circle: The total area is 132 acres and the crop 80-100 year oak, etc., with scattered conifers. It is proposed to regenerate one tenth of the area in the Working Plan period.

The annual felling will therefore be 1.3 acres.

The fellings are to be made in groups not exceeding a third of an acre in extent, scattered through the Woods. Each annual felling is to

be restricted to one compartment, beginning with No.33 and proceeding in order through 34, 35, 36, 37 and 38, and again returning to 33 in the 7th year.

The central parts of the groups are to be planted with oak, and the periphery with beech. Where the soil is poor conifers (e.g. silver fir) and beech are to be planted. Other timber trees of aesthetic value may also be introduced.

Oak Circle. The total area is 600 acres and the crop is 80-100 year oak with occasional ash and conifers. The question is not so much what area should be regenerated as the maximum which may be cut to supply comtemporary needs. Under the system of regeneration which is proposed below it is necessary to look ahead 20 years instead of 10, and I consider that the maximum area which should be regenerated in 20 years is 200 acres, of which a maximum area of 150 acres, but better only 100 acres should fall in the first 10 years. This gives a maximum of 15 acres per annum or if 4 years' fellings be anticipated at the present juncture, 75 acres which may be cut over at once to meet the needs of the Timber Supply Department.

It is proposed to do the regeneration by groups (roughly 200 ft. x 100 ft.) in compartments on the margins of Inclosures, and by strips, roughly 100 ft. wide, in the interior compartments. It is necessary to proceed in this way for the following reasons:-

(a) The Oak Circle compartments are low lying and in most cases there is danger of frost.

(b) The woods are open and weed growth will be strong on felling. The mat grass, Aira caespitosa, which has given so much trouble at Salcey, is present in many places, and will render regeneration very difficult if large openings are made.

(c) A trial group regeneration (Compartments 75) on an area about one third of an acre made in 1914-15 has proved extremely successful.

Each compartment is to be treated as a unit for regeneration purposes; i.e. the compartments in which fellings are first made will be placed "under regeneration", and the process completed within 20 years from the

time the first cut is made. There is no need to arrange the fellings into cutting series, as the Oak Circle woods are well-sheltered, but generally the direction of fellings should be from north-east to south-west. The long axes of the groups or strips must be arranged from a north-west to south-east to a west to east direction as the soil throughout is heavy and moist and the new plantations will require adequate shade from the mid-day sun.

The tracing herewith shows the manner in which it is proposed to regenerate Compartments 13 (by groups) and 9 (by strips).

Failing natural regeneration the replanting will be done with oak and larch, spaced 4 ft. as follows :-

x 0 x 0 x

0 0 0 0 0

x 0 x 0 x

x = Larch
0 = Oak

Where larch is not likely to prove a good nurse alder may be used. Ash may be substituted for oak where the soil is moist and well drained.

The eastern and northern compartments of Straits Inclosure should first be taken in hand.

Conifer Circle The total area is 1164 acres. The present procedure with regard to this is satisfactory but may require modification in the following directions:-

(a) Revision of the area to be felled.

(b) The institution of more cutting series. This would give greater elasticity to operations. A new series might be started each in Holt Pound and in Lodge Inclosures.

For the moment it is not urgent to decide on the scheme for this Working Circle.

General

For the compilation of the complete Working Plan the compartment boundaries must be inspected on the ground, and rectified as necessary, the stock map revised and the silvicultural data which have accumulated examined to provide a guide for future planting. In this connection it may perhaps be possible to make some use of the disabled officers who are undergoing the special forestry course at Oxford.

APPENDIX IV

GROWTH STATISTICS FOR OAK

P 1815 - 1825 at Alice Holt Forest

1) Summary of Partial Stem Analysis Carried Out on 50 Trees in Lodge Inclosure (Average Age of Trees, 130 years).

Table (a)

Age (Yrs.)	30	50	70	90	110	130	150
Number of Trees	1	18	50	31	31	30	1
Mean Volume	2.2	6.7	13.3	22.7	32.6	40.8	177.1
Mean Volume 20 yrs. later	8.7	14.1	21.6	32.6	40.8	-	-
Increment per cent	14.7	5.5	3.1	2.2	1.3	-	-

Table (b)

Age	Average vol. per tree cu. ft.	Current Annual Increment		Mean Annual Increment cu. ft.
		per cent	cu. ft.	
30	2.2	) 5.06	.225	.07
50	6.7	)		.13
70	13.3	3.3	.33	.19
90	22.7	2.6	.47	.25
110	32.6	1.8	.495	.30
130	40.8	1.1	.41	.31

The deductions to be drawn from the above tables are :-

(i) The Current Annual Increment (C.A.I.) culminates between 90 - 110 years.

(ii) The Mean Annual Increment (M.A.I.) has not yet quite culminated although it is part offset by pipe rot.

A graph has been constructed to show the M.A.I. and C.A.I. Within the limits of the available data, it is not possible to complete the curves

to show where the C.A.I. falls below the M.A.I. The curves have, however, been arbitrarily extended along their probable lines of development. This reveals that at about 130 years, the lines cross indicating that a 130 rotation would be sound mathematically. None the less, so long as the M.A.I. continues to increase there would be a case for retaining the trees longer for those general economic reasons which now partly dictate our policy. Even so, the question of pipe rot cannot be ignored, and a rotation of about 150 years would seem to be the maximum for sound management.

2) Oak Sample Plots

Half acre oak sample plots were established in the following inclosures: Goose Green, Straits Lodge, and Holt Pound. Measurements of girth over bark were made in 1911, 1916, 1921, 1926, 1931 and 1936. No further measurements were made until 1948, but only two trees remained unfelled in the Straits Inclosure plot.

(a) From the above data, a series of figures for the Annual Increment per cent have been produced:-

Table (c)

Inclosure	No. of Trees in Plot	Period	Annual Increment per cent
Goose Green	32	1911 - 21	1.74
Straits	26	" "	1.34
Lodge	26	" "	1.71
Holt Pound	36	" "	1.98
Goose Green	32	1916 - 26	0.9
Straits	26	" "	0.6
Lodge	26	" "	0.7
Holt Pound	36	" "	1.0
Goose Green	32	1921 - 31	0.8
Straits	26	" "	0.9
Lodge	26	" "	0.5
Holt Pound	36	" "	0.7
Goose Green	32	1926 - 36	0.7
Straits	26	" "	0.9
Lodge	26	" "	0.6
Holt Pound	36	" "	0.7
Goose Green	32	1936 - 48	1.25
Straits	2	" "	1.3
Lodge	26	" "	0.9
Holt	36	" "	1.6

Table (d) below shows the average girth development in the oak plots from 1911 to 1948. The figures in brackets indicate the numbers of trees measured on each occasion. The reduction in the numbers of trees is due to the death of oak within the sample plots.

Table (d)

Year	Figures show quarter girth inches			
	Straits Inclosure	Goose Green Inclosure	Lodge Inclosure	Holt Pound Inclosure
1911	54 (26)	51.5 (32)	51 (26)	46.0 (36)
1916	56.5 (26)	54 (32)	54 (26)	47.5 (36)
1921	57.5 (26)	56 (32)	55 (26)	49 (35)
1926	58 (26)	56 (32)	55.5 (26)	50 (35)
1931	60 (26)	58 (32)	56.5 (26)	51 (34)
1936	61 (26)	59 (31)	57.5 (23)	51.5 (32)
1948	-	62 (31)	58 (23)	56 (29)

The Straits Inclosure shows the most satisfactory girth increment

VOLUMES OF TIMBER FELLED ON COMPARTMENT 34, LODGE INCLOSURE (in 1949-50)

Species	Num. of trees	Less than 8"		8-9¾"		10-11¾"		12-13¾"		14-17¾"		18" & over		Total	
		Volume	Logs	Volume	Logs	Volume	Logs	Volume	Logs	Volume	Logs	Volume	Logs	Volume	Logs
Oak	387	137.75	31	1491.42	154	2341.00	134	3325.67	130	4115.26	117	1332.92	24	12,744.02	590
Spanish Chestnut	54	118.92	22			729.75	42			76.58	1			925.25	65
Beech	1			10.17	1					15.50	1			25.67	2
Total number of trees 442												Totals		13,694.94	657

	Oak	Chestnut	Overall
Average volume per tree	32.93 cu.ft.	17.13 cu.ft.	30.98 cu.ft.
" " " log	21.60 "	14.23 "	20.84 "

Volume of oak per acre = 980 cu.ft.
Volume of chestnut per acre = 71 cu.ft.

Total volume per acre = 1050 cu.ft.

Note. This is the remnant of the original crop. Previous fellings for group planting would have brought the average volume per acre to approximately 2,000 cu.ft.

4

ALICE HOLT FOREST

50

28 SW | 28 SE
HANTS

BENTLEY

Alton

Farnham

HOLT POUND

ROWLEDGE

Electric Railway

River Wey

Bentley St.

Alice Holt Lodge

Lodge Pond

to 50

BUCKS HORN OAK

BLACK NEST

Binsted

Bentley & Bordon light railway

BATT'S CORNER

FRITHEND

Peterfield

Fores Ldg.

28 SW
36 NW HANTS

HANTS 28 SE
36 NE

INCLOSURE	Cpts	Area
THE STRAITS	1-13	2359
GOOSE GREEN	14-22	2216
LODGE	23-38	4104
HOLT POUND	39-47	2098
GLENBERVIE	48-61	3677
WILLOW'S GREEN	62-69	1984
ABBOTTS WOOD	70-79	2417
Woodlands	1-79	19455

F.C.'s area boundary
Compartment
Plantation
Species

Conifer plantation
Pre-F.C. cf
Broadleaved
Pre-F.C. bl
Coppice

HANTS 36 NW | 36 NE

Scale: 6" to 1 mile.

0 10 20 30 40 50 60 70 80 CHAINS
1 MILE

Metalled roads
Unmetalled roads

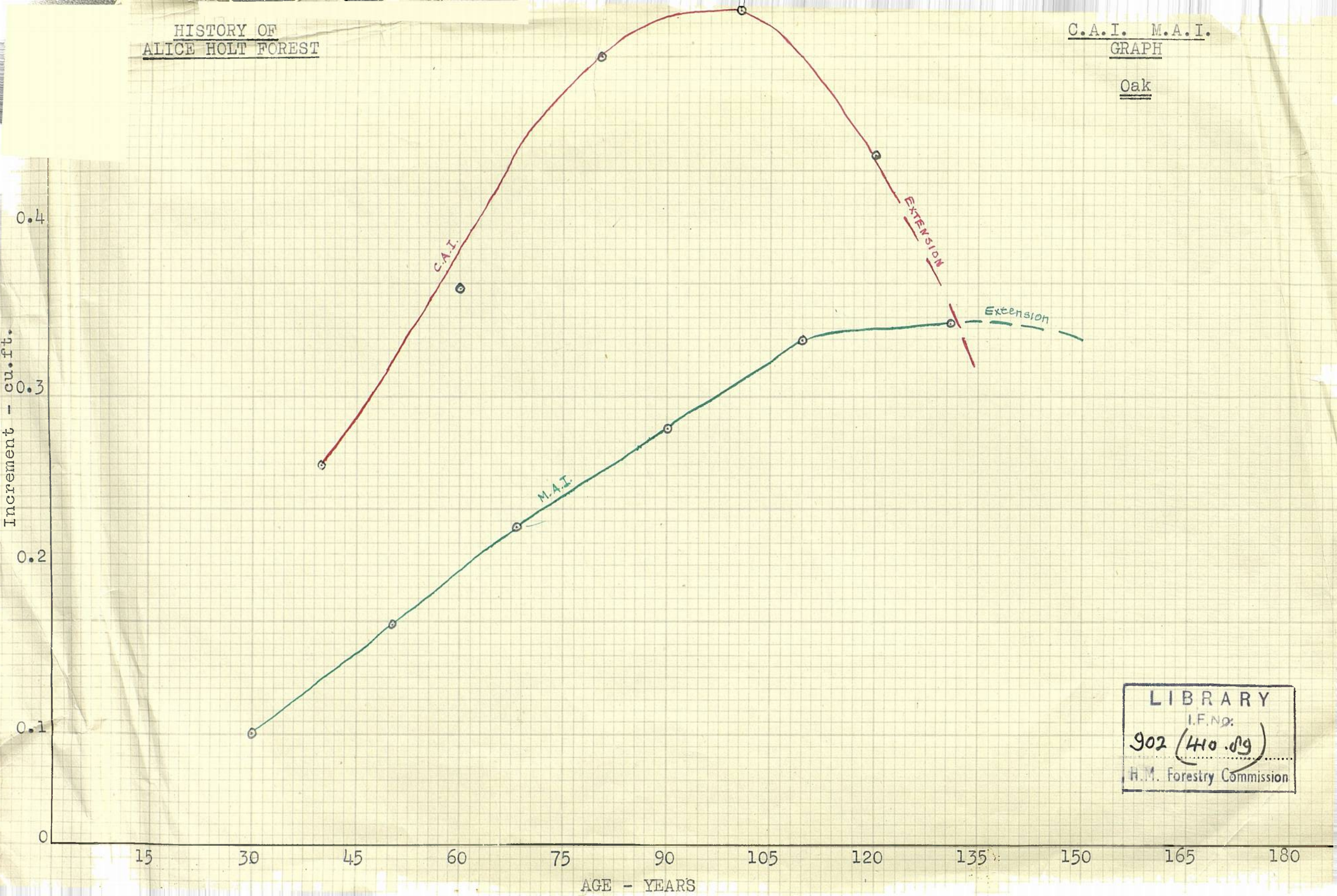
K

Kingsley Holt

HISTORY OF
ALICE HOLT FOREST

C.A.I. M.A.I.
GRAPH

Oak

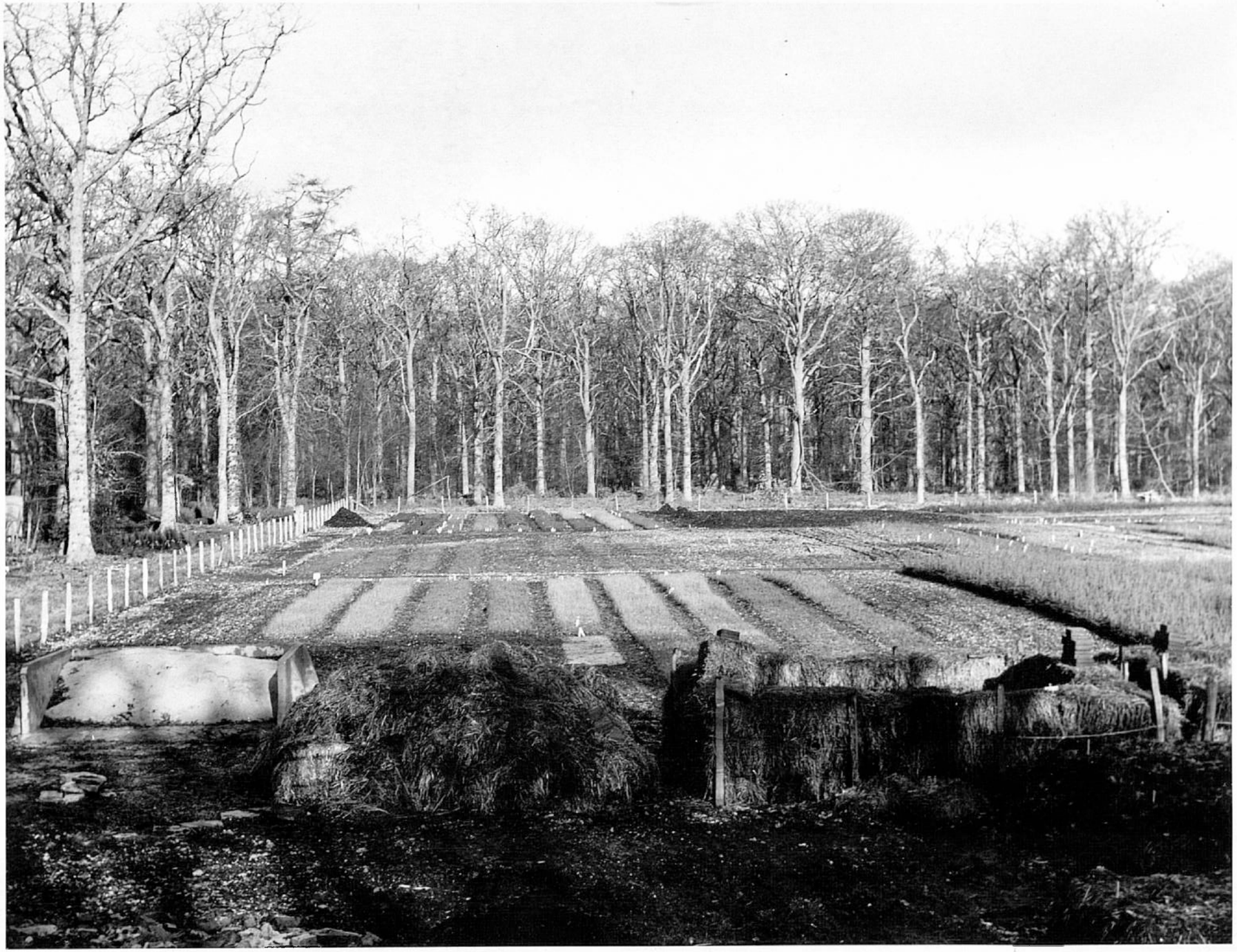


General view Alice Holt Woodland Nursery (Research)

Alice Holt.

Alice Holt Woodland Nursery (Research)
General view. Compost bays in foreground.

Alice Holt.



General view with straw compost bays in the foreground.

Alice Holt arable Nursery (Research)
now taken over by the Geneticist.

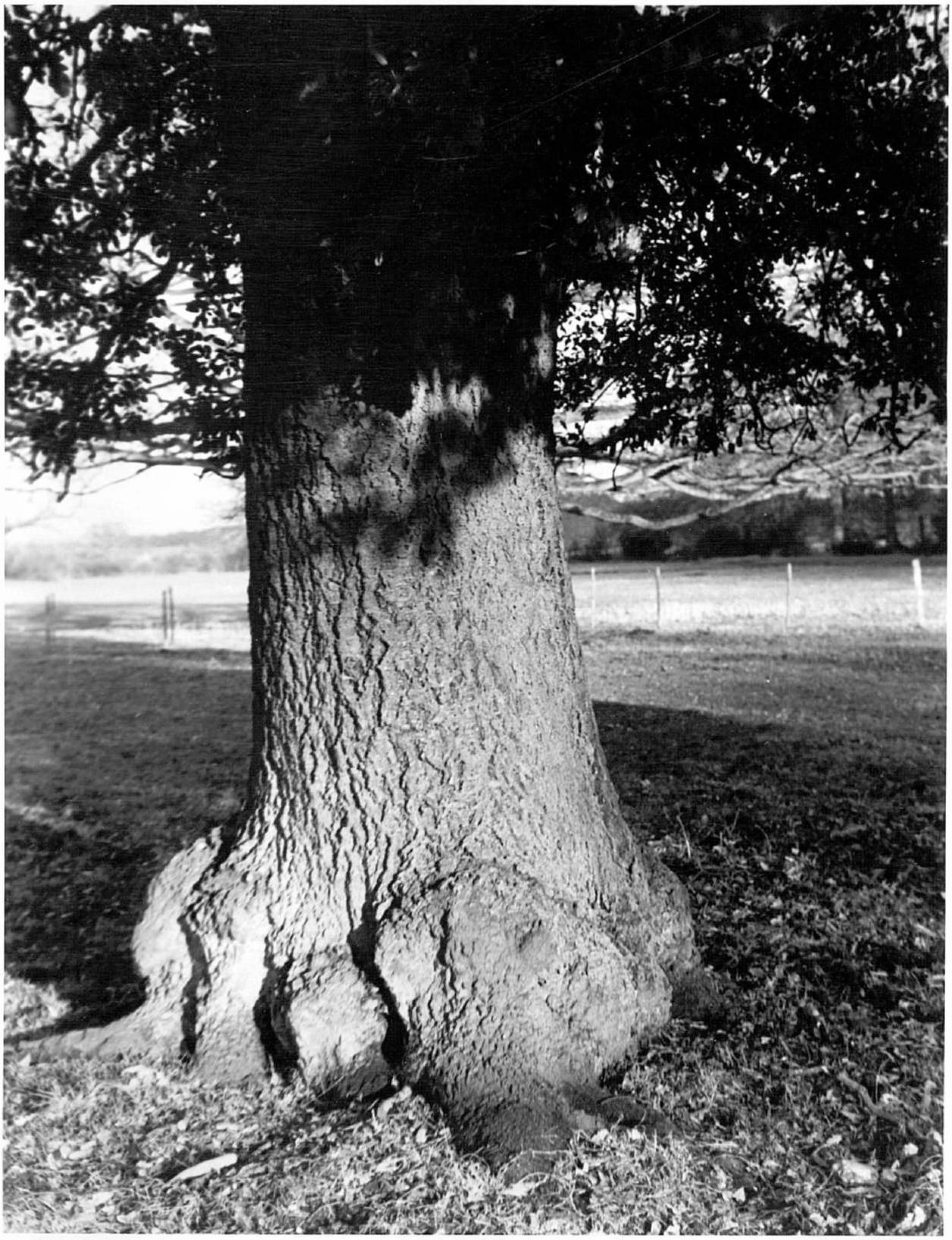
Alice Holt.

Sample Plot measuring in Oak.

Alice Holt.

Evergreen Oak (unusual type)

Alice Holt.



Bole of same tree.

Alice Holt

CP/SP - P.86 - Glenbervie Inclosure

Alice Holt

Glenbervie S.P. P.38. (S.S. in valley)
J.L. P.47 foreground

ALICE HOLT.

E.L. - P.33 - Compt. 43 - Holt Pound Inclosure.
Poor form and development.

Alice Holt.

P.30 Oak Groups - Compt. 34 - Lodge Inclosure.
Surround from acorns P.50

Alice Holt.

Oak aged about 130 years - Compt. 34 - Lodge Inclosure

130 year old oak)
P.30, Oak Group) - Compt. 34 - Lodge Inclosure

Surround from acorns P.50

Alice Holt.

Comps. 8 & 9. Straits Inclosure strip planting of oak p.22. p.44 and original oak.

Alice Holt.

Oak. Comp. 16

Alice Holt. 15

Comp. 49. C.P. P.20

Alice Holt.

Comp. 56. S.S. P.42 b.u. SP. CP. D.F.

Alice Holt

Replanted 45. Bird Cherry and Norway Maple Comp. 57.

Alice Holt.

Comp. 61. Oak P.38

19

Alice Holt

Snow damage 16th April, 1950

P.30 C.P) Abbots Wood
P.31 S.P)

Alice Holt.

J.B. - P.43 - Compts 46, 47 - Holt Pound Inclosure.
Snow damage, 26th April, 1950.

2.

Alice Holt.

J.L. P.43. Compts 46, 47 - Holt Pound Inclosure.
Snow damage, 26th April, 1950.

Alice Holt.

Snow breaks 26th April, 1950 . E.L. P.26 - Willows Green

23

Alice Holt.

HISTORY OF ALICE HOLT FOREST 1951 – PHOTOGRAPHS

Location	Caption
Alton Holt Woodland Nursery	General view Alice Holt Woodland Nursery (Research)
Alice Holt Woodland Nursery	Alice Holt Woodland Nursery (Research) General view. Compost bays in foreground.
Alice Holt Woodland Nursery	General view with straw compost bays in the foreground.
Alice Holt Arable Nursery	Alton Holt Arable Nursery (Research) now taken over by the Geneticist.
Alice Holt Forest	Sample Plot measuring in Oak.
Alice Holt Forest	Evergreen Oak (unusual type).
Glenbervie Inclosure	Bole of same tree.
Glenbervie Inclosure	CP/SP – P.86 – Glenbervie Inclosure.
Holt Pound Inclosure	Glenbervie S.P. P.38. (S.S. in valley) J.L. P.47 foreground.
Holt Pound Inclosure	E.L. – P.33 – Compt. 43 – Holt Pound Inclosure. Poor form and development
Lodge Inclosure	P.30 Oak Groups – Compt. 34 – Lodge Inclosure. Surround from acorns P.50.
Lodge Inclosure	Oak aged about 130 years – Compt. 34 – Lodge Inclosure.
Lodge Inclosure	130 year old oak. P.30, Oak Group – Compt. 34 – Lodge Inclosure. Surround from acorns P.50.
Straits Inclosure strip	Comps. 8 & 9. Straits Inclosure strip planting of oak p.22. p.44 and original oak.
Alice Holt Forest	Oak. Comp. 16.
Alice Holt Forest	Comp. 49. C.P. P.20.
Alice Holt Forest	Comp. 56. S.S. P.42 b.u. SP. CP. D.F.
Alice Holt Forest	Replanted 45. Bird Cherry and Norway Maple Comp. 57.
Alice Holt Forest	Comp. 61. Oak P.38.
Abbots Wood	Snow damage 16th April, 1950. P.30 C.P., P.31 S.P. Abbots Wood.
Holt Pound Inclosure	J.L. – P.43 – Compts 46, 47 – Holt Pound Inclosure. Snow damage, 26th April, 1950.
Holt Pound Inclosure	J.L. P.43. Compts 46, 47 – Holt Pound Inclosure. Snow damage, 26th April, 1950.
Willows Green	Snow breaks 26th April, 1950. E.L. P.26 – Willows Green.