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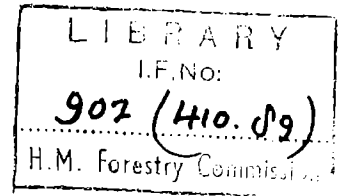
BURITON

FOREST

SECE) CONSERVANCY

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FORESTRY COMMISSION

HISTORY

of

BURITON FOREST

1928 - 1951

SOUTH EAST (ENGLAND) CONSERVANCY

History of Buriton Forest

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HISTORY OF BURITON FOREST

NOTE BY THE CHAIRMAN (LORD ROBINSON)

ON THE AFFORESTATION OF CHALK AREAS.

In our afforestation of bare chalk downs and limestone areas we have been groping for some 25 years or so to find successful methods. This has gone on at a number of places, of which Friston and Buriton in Conservancy S.E. (E) are the most important chalk areas. The oolite at Allerston is a good limestone example.

Gradually we have been getting to the bottom of the problem and now appear to be well in sight of reasonable solutions. In the course of the whole process a great deal of experimental work has been done (notably at Buriton and Friston) and some informative plantation work done in the ordinary course of conservancy operations.

I set out below the order of events as I recollect them.

Main species

It was agreed from the outset that the main crop species on chalk and limestone would have to be beech with sycamore perhaps as a subsidiary species and with ash in the damp places. Evidence in favour of sycamore was fragmentary.

Nurses

It was tacitly assumed that beech at least required a nurse. To begin with European larch was used on a large scale but behaved very erratically on the chalk downs. Survival was unsatisfactory and initial growth very slow. European larch was therefore abandoned as soon as its poor value was fully realized but no consistent line was then followed or indeed apparent. A good deal of beech was planted without nurses using experimentally such devices as cultivation but efforts were also made to find a nurse to replace European larch. Natural growth such as elder (especially round old rabbit burrows) gorse and thorn (which began to invade downland when enclosed) were made use of when at hand. Broom was sown and for a time gave promise of results.

The first experimental work at Buriton pointed to grey alder as a suitable nurse for beech but the results were applied too quickly to downland on

the mistaken assumption that the soil conditions were similar. In the upshot grey alder proved a broken reed.

The next steps in my recollection were with pines as nurses. I found a small plantation (since burned) in the Isle of Wight where Ursuline Corsican pine had reacted excellently on beech. Mr. Felton at Friston made a mixed Scots pine/beech plantation which showed great promise when I first saw it in 1941. Further experimental work at Buriton has confirmed the effectiveness of pines (Scots, Corsican and Austrian) as nurses.

Behaviour of Pines

It was at one time thought that Corsican pine was thoroughly at home on limestone and chalk. My faith in that idea was shaken on finding, in the early 30's, extensive deaths in Highmeadow (mountain limestone) and in Cirencester Forest Garden (oolite). Later it became apparent that normally Scots pine in pure crops begins to die off between the 20th and 30th years. (Isle of Wight and Allerston). Although Corsican pine dies too it seems to be more at home and anyway lives longer. There are examples at Allerston (large scale) and Buriton (experimental) where successful group planting of beech has been done in dying pine crops.

Vitality of beech

If beech can resist drought and spring frost for the first year or two after planting, they then exhibit remarkable powers of vitality and, ultimately, recovery. I have observed numerous sporadic examples, the most striking example being in King's Forest. There part of Queen Mary's Avenue (beech and birch) planted in 1938 on dry sandy soil overlying "dead" chalk started off well enough but was grazed unmercifully in the early war years by thousands of rabbits. The beech were reduced to (apparently) dead sticks a few inches long and about 1 in. diameter. I had a couple of small plots netted in 1943 and to our astonishment quite a high proportion of the beech came to life again and have since grown reasonably well.

This is an important characteristic of beech which I have only slowly come to appreciate. It has to be borne in mind when considering whether to plant beech and nurses together or to bring in the beech under nurses at a later stage. I have no doubt in my own mind that both should be planted at the same time.

Need for Patience

I have always insisted that patience is essential in establishing hardwood crops and it appears that beech requires an even greater amount than oak. It seems to take longer to get the "forest conditions" which is a convenient term for the complex changes which have to be brought about before beech develops freely. I remarked on the occasion of my last inspection of Friston (summer of 1945) "It is worth noting perhaps that it has taken 18-19 years to reach this stage where alder and larch have been used as nurses and that it has not yet been reached in pure beech and pure ash crops below the "frost line", and added ". . . this is the first occasion on which I have felt any real pleasure in inspecting our Friston effort. I think that woods properly established and tended should develop well in the long run and that we now know how to handle the major problems." In saying that I had also in mind the use of pine nurses.

Collection of further Data

It is important that we collect and analyse all available evidence from mixed beech/pine plantations, viz: such data as the relative rates of growth and the effect of treatments designed to promote the growth of beech where threatened by the more rapid initial growth of pine. In this respect the history of Friston is defective but, as noted above, Friston is not the only forest which can supply information.

Possible use of Norway spruce as a nurse for Beech

It is curious that we have tended to overlook this point, although I have drawn attention to it in an article entitled "Some Ecological Aspects of Afforestation and Forestry in Great Britain" (Forestry, Volume XVI, 1942).

The reference reads :-

"Norway Spruce in Mixture with Beech and Ash. Passing now to the other extreme of difficult sites, namely the open chalk downs, it can be stated that pure beech and pure ash plantations check almost as badly as do pure spruce on Calluna sites. Scots, Corsican, and Austrian pines, however, play the same part in bringing on beech on chalk as the pines do generally with spruces, etc. on heather. It seems probable, though difficult now to confirm, that many of the isolated clumps of beech on the Downs were raised in this way.

Compartment 21, Gardiner Forest, is an example, and there are others in the same neighbourhood.

Unexpectedly, also, Norway spruce will serve the same purpose as pine on chalk. Plate VIIIb illustrates the results which can be obtained. Between the dark spruce right and left are a thin but vigorous ash (left) and vigorous beech (centre). The forest is Brighstone Down (Isle of Wight), Compartment 15, exposed directly to the south-west winds, soil very thin over the white chalk. The plantation was made in P.20 by a former proprietor and eaten back to ground level by rabbits. Properly protected since 1929, the broad-leaved trees have now attained in 12 years a height of 20 ft."

Present Practice of planting Beech/Pine Mixtures at Friston

Mr. Smith in his note on the Friston history states that he has gone over to the 3-row/3-row mixture. I have some doubts about this. The beech should be adequately nursed but what will be the picture when the pine begin to die? If they all die the beech rows will be separated by a corresponding distance which would be four times the distance between rows i.e. 18 ft.

I think the risk of deaths from Fomes annosus on former agricultural land is greater than on virgin down land and beech itself is by no means immune from Fomes.

My own inclination would be to play more for safety and to plant a 2-row/2-row mixture.

"R"

23.2.51

HISTORY OF BURITON FOREST

GENERAL DESCRIPTION OF THE FOREST

Situation

The forest is situated in Hampshire, some two miles south of the town of Petersfield. The village of Buriton, lying about a quarter of a mile to the north of the area, gave it its name when the first acquisitions were made in March, 1928.

Area and Utilization

Acquisitions were made in 1928 and in 1935 partly by purchase and partly by lease. Various portions of the leased area were surrendered in 1929 and disposals made to the County Council in 1931 and to an adjoining landowner in 1933 of parts of the purchased portion. In none of these parcels had any cultural operations been undertaken and, accordingly, the nett acreages remaining to the Commission are given in Table I.

The acquired land fell into three clearly defined types -

- (a) open downland
- (b) old woodland in process of clear-felling of reserved timber
- (c) old woodland semi-devasted and containing aged beech, yew and ash with typical chalkland minor species.

Certain parts of the downland had been at one time under cultivation, but the greater part was rough grazing, carrying a dense population of rabbits, and its prime use was for sporting. In certain valleys and on the lower slopes of the down a number of fields had been enclosed by hedges and maintained as reasonably good grazing. The majority of these fields were kept either as agricultural on annual lease pending planting or as holdings for forest workers. The war of 1939-1945 and the national food situation in the post-war years stabilized utilization and in March 1946 185 acres were transferred to the Ministry of Agriculture. The balance of 21 acres are leased as bye-takes to two of our F.W.H. tenants.

by-takes!

TABLE I

From	By	Date	Pltns Acqd.	Pltable excl. Col.4	Nur- series	Agricul- tural	F.W.H.	Unpltable excl. Col.4	Total
1	2	3	4	5	6	7	8	9	10
Col. Bonham -Carter	Purchase	27.3.28	30	1071	11	206	45	6	1369
C. J. Cave, Esq.	Lease	27.3.28	12	319	-	-	9	-	340
Sir J. Calder	Purchase	3.10.35	-	23	-	-	-	-	23
Totals			42	1413	11	206	54	6	1732

TABLE II

(a) Plantations

Acquired	...	...	40	
Formed by Commission	...	...	1370	1410 acres

(b) In hand, awaiting planting -

Blanks after felling	...	...	Nil	
Burnt areas	...	...	Nil	
Other land	...	...	45	45 acres

(c) Nurseries 11 acres

(d) Agriculture. Number of Tenancies 3 area 206 acres
(including Ministry of Agriculture)

(e) F.W.H. Number 9 area 54 acres

(f) Unplatable land in hand (Chalk pits) 6 acres

Total 1732 acres

Physiography

This forest lies at the western end of the South Downs. Elevations vary from 300 ft. to 866 ft., the ground being sharply undulating. The area is intersected by three valleys, which run roughly north-south. Resultant aspects are mostly east or west, but some ground dips to the south, whilst to the north of the forest there are steep slopes with northern aspects. Since the sea is only ten miles away, certain areas are exposed to the salt-bearing winds. Exposure on the downland tops and south and south-west slopes is very severe and constituted perhaps the most difficult problem in the afforestation of the area.

Geology and Soils

The formation is Cretaceous, the solid geology being the Chalk, except at the very northern end, where the Upper Greensand is found. Overlying the chalk over most of the area is clay, or in places loamy clay with flints. The soil is of fair depth in the valleys but shallow on the upper valley slopes. Owing to the presence of the flints, the soils are well aerated, and natural drainage is good. The depth and quality of the soil is very variable indeed.

Vegetation

Most of the downland carried fine grasses heavily grazed by rabbits. Occasional patches of bracken occurred towards the south and thorn was sporadic with scanty rowan and whitebeam. In the woodland areas, bracken, blackberry, dogwood, privet and Clematis constituted the ground vegetation in strength varying according to the density of ash and birch poles and aged beech and yew trees.

Meteorology

The annual rainfall is about 30 ins., the conformation of the ground producing a somewhat heavier rainfall inland than there is upon the seaboard ten miles southwards.

The prevailing winds are from the south-west.

Severe frosts are seldom experienced, but in the valley bottoms damage has been suffered from late frosts in most years. Drought conditions are liable to occur for longer or shorter spells annually on the high ground and southern slopes. Generally speaking, however, the climate is decidedly mild and snowfall is rarely heavy.

Risks

The forest, being on the South Downs, has always been popular with walkers and much use is made of several recognized rights of way across it. The fire record, however, shows no cases of outbreak due to walking parties within the forest and the two main possible sources of fire have been and are the Portsmouth railway line between Ditcham and Head Down and the Petersfield Portsmouth road on the western boundary.

Both have been the origins of fire and cultivated fire-lines are maintained alongside them. The risk of fire is not very severe, but up to

the present hazard has been high in spring and autumn owing to the slow growth of the trees on a large, hilly expanse on which grass generally flourished after rabbits were removed. In recent years, with increasing canopy formation, this danger has been decreasing, but patrols and fire-tower watching are still necessary during dry periods in these seasons.

Rabbits were extremely numerous, but were adequately controlled within the enclosures. The pressure against the fenced areas was always severe due to the population on adjoining land until the Agriculture Executive Committee took action during the war years. Since then these animals have not been a serious menace, but two warreners are necessary to control them, as there was a certain amount of invasion following destruction of netting during the war.

A much more serious pest, in the shape of the grey squirrel, took the place of the rabbit and began to make its presence felt in the late thirties as beech plantations reached the thicket stage. Adjoining woodlands and scattered mature trees throughout the forest itself afforded excellent breeding places for the squirrels and within the last decade they have become very numerous and have done an immense amount of damage to beech.

Active measures were taken against them, mainly by shooting, and the annual kill varied between 500 and 1,000. It was doubtful, however, if this kept up to the breeding-rate and in spells of drought severe damage was a regular occurrence. In 1950 the Buriton Warrener, J.V. Legg, evolved the squirrel trap which bears his name and it has proved conspicuously successful from May to September. It is hoped that this trap may prove an adequate means of control.

Voles and mice proved troublesome as the grass responded to rabbit control, but never reached plague proportions and ultimately ceased to be a nuisance.

A considerable amount of damage from canker has been sustained by the beech and this, combined with squirrel attack and bad stem-form make many of the beech plantations a very sorry sight, though usually one finds a sufficient number of good survivors to hold out some promise of a reasonable final crop of this species. The number, however, of such trees is generally dangerously low and there can be no compromise over squirrel control in particular and protection in general.

Roads

The forest is well served by one main (A.3) and several subsidiary public roads. Within the forest areas existing tracks generally have easy gradients and are on firm sub-soil, which lends itself to cheap wheel-tracking with small hardcore and clinker. These make adequate roadways for access and the haulage of thinnings by lorry.

Access has always been favourable and workers can reach most of the forest on cycles so that transport has never been necessary for our labour.

Labour

Workers have been available from local villages and, except for the War years, the supply, both in quantity and quality, has been satisfactory. A large programme of arrears of cleaning has been successfully dealt with since the war ended. Such neglect took heavy toll of larch nurses, and, to a lesser extent, of beech, in areas where Clematis had become luxuriant, but, in normal times, lack of labour cannot be held responsible for any cultural mistakes.

At present the forester has a foreman and 25 workers at his command.

SILVICULTURE

General Outline of Forestry Problems Involved.

The whole of Buriton Forest may be regarded as a large scale experiment in the afforestation of downland areas. This generalisation applies not only to the comprehensive experimental plots laid out by the Research Branch, but also to the normal departmental forest operations. We are now in a position to look back on over twenty years of trial and error, and it becomes possible to formulate fairly definite lines of approach to the problems involved.

One lesson, which has been demonstrated repeatedly, is that of the unwisdom of laying down overall rules for the forest. Soil conditions vary greatly from place to place; aspect and exposure may be of little significance in one corner, but exert significant influence at a point a hundred yards away. Each part of the forest must be considered separately, and account taken of its many variations. The result is that although this is not a large unit, it is a complex one. It demands a detailed knowledge of its peculiarities for successful administration.

The initial problems facing the Commission in 1928 were

- (i) The destruction of vermin, especially rabbits.
- (ii) The choice of species
- (iii) The best means of raising the selected species, including the question of prior soil cultivation, and the use of nurses.

The rabbits were successfully dealt with, and they are now far less of a danger than grey squirrels. Choice of species and questions of silviculture are reviewed in the following paragraphs.

Choice of Species

This resolved itself into acceptance of beech as the main tree species, with ash as a possible subsidiary in the more fertile valleys. Both of these trees are at home on calcareous soils, although the latter is much more exacting than the former. That beech could grow successfully on similar soil conditions was clear from the many excellent groups of beech, to be seen crowning the Downs, especially in Sussex. The Singleton beeches are a fine example of this, but there are many others. There were examples in the forest itself:- the Ditcham Estate on the east of the forest boasted some excellent beech at the time of the acquisition.

Natural regeneration of beech should be possible at Buriton, provided the rabbits are kept in check. Regeneration of ash upon the poorer chalk areas is likely to be disappointing: the experience at Charlton Forest and elsewhere seems to show that although this tree may regenerate profusely on thin soils, the crop comes to nothing. It seems to develop reasonably well for a few years, then takes to repeated forking and the rate of growth is disappointing. Ash regeneration is worth preservation on the better soil types, but of doubtful value in other cases. It cannot be said that ash has been conspicuously successful anywhere at Buriton. It has suffered from frost in the valley bottoms, the occasional good specimens being found above the frost level, in mixture with larch and beech.

Apart from Corsican pine and Norway spruce, it is doubtful whether any conifers are worth trying as final crop trees. There are a few Corsican pine and Norway spruce about 60 years old in the forest, and though these trees are poor by other standards, they are as good as we could expect in downland conditions. But even these conifers are best kept as nurse

species. The economical rotation of most, if not all conifers on chalk will hardly exceed 40 years. If they are used as nurses, a good beech crop should cover the ground, after they are removed in silvicultural thinnings.

The question of the best nurse species is dealt with later.

Cultural Operations

General

In his visit of 7.7.41, the Chairman laid down certain guiding principles, to be followed in future operations at Buriton. It will be convenient to state these at the outset. The full text of the recommendations is given as Appendix III to this history. The principles are:-

(i) Open Downland

Maintain all existing nursing material whether planted or natural, and augment if necessary by further beating up with Scots pine and control it by judicious cleaning when the beech show signs of suppression.

(ii) Clear-felled Woodlands

When nurses in the form of planted larch, natural coppice and birch have outgrown the beech and begun to form an overhead canopy, weeding must be in accordance with (iii) below. Where, as is more often the case, the beech and nursing material are more or less level in a dense mass, cleaning is only necessary if enough trees to form a crop have not yet pushed through.

(iii) Felled Woodlands Retaining an Overhead Canopy

Beech must be weeded hard, and no intermediate canopy can be allowed to form. The overhead canopy must be carefully regulated by thinning or summer ringing.

The question of whether or not beech requires a nurse tree, under different circumstances, has been much argued. This question is closely tied up with the problem of cultivation of the soil prior to planting. It is certain that cultivation does benefit the crop greatly, and even on relatively adverse sites a plantation of beech might well succeed, if the soil were to be previously cultivated. On the top of War Down, nearly 800 ft. above sea level, there is just such a site. The figures in Appendix IV show that these trees were 8 ft. high fifteen years after

planting, and this is not unsatisfactory on a difficult area. Pure beech have done better elsewhere, as the table shows.

It does, however, seem likely that beech planted pure upon a difficult site, without prior cultivation, will suffer a serious check. There is this further consideration - although pure beech have succeeded on cultivated areas, they might well have done even better had they been in mixture with a nurse tree. Apart from the protective functions of the nurse, recent assessments at Buriton are almost conclusive in pointing to the improved form of nurse-raised beech. These assessments have been made in plots which include beech of many different origins, and all seem to show a marked superiority in form to their un-nursed neighbours. The nurse appears, in fact, to partially inhibit the tendency to fork apparently inherent in many beech. Evidence is afforded by a study of beech planted through gorse. The beech have prospered (probably as much through the soil-improving nature of the Leguminosae as through their protective value) but now that the trees have overtopped and killed out the gorse, a distinct tendency to fork is noticeable.

Most nurse trees also have the advantage of providing a valuable intermediate yield, early thinnings in beech being of small value. At the moment of the preparation of this history, valuable produce is being prepared from larch nurses.

The problem of establishing beech at Buriton has been, then, the problem of finding the best nurse species. Allied to this are the questions - whether the beech and its nurse should be planted at the same time, or the beech introduced afterwards, and whether the beech is best planted in groups in a matrix of the nurse species or in rows. The Research Branch will be covering some of these aspects in a separate report.

Nurse species for beech

In 1928 a plot of grey alder (Alnus incana) was laid out on the relatively favourable site of Holt Down. It prospered, and during the following years was widely used as a pioneer species at a spacing of 9 ft. x 7 ft. It was known to possess soil-improving qualities, and beech was to be introduced later. Almost everywhere it failed miserably - illustrating the point made earlier that conditions vary throughout the forest. The deeper soils of Holt Down could sustain alder, whereas the

shallow turf of War Down proved inadequate. Where the alder was planted in favourable areas (e.g. Compartment 22. P.35) it prospered, and has shown itself there to be a satisfactory nurse to beech introduced in F.Y.38.

Prior to the large-scale planting of grey alder, larch had been widely used as a nurse species, most of Holt and Head Downs being so treated between F.Y.28 and F.Y.31. The results were irregular, and in some places the beech overtopped the larch at an early age, though in most cases the trees have grown up more or less together. Only in the areas of relatively good soil have the larch done well, and are now furnishing a very useful amount of produce. None the less, the 1938 census revealed that these and other plantations, often had a stocking as low as 50 per cent.

Meanwhile, a part of War Down (Compartment 36) had been planted with a 75% beech/25% birch mixture in F.Y.32. Some of the birch were imported from outside nurseries, but most were dug up from areas of natural regeneration in the forest and used after one year's lining-out in the Buriton Nursery. This was a fairly successful plantation. Near to it, beech were planted amongst old, natural yew (F.Y.35). The yew were thinned and branches lopped off in F.Ys 36 and 44. This too has been quite satisfactory.

In F.Y.39, Scots pine emerged as the favoured nurse. The failed grey alder areas were then planted with 75% beech/25% Scots pine mixture. This was beaten up in F.Y.41 with both species, but subsequently beating-up (now terminated) was confined to Scots pine. The areas referred to are mostly on War Down, and one is struck by the very irregular growth of both beech and Scots pine there. These variations are in part due to early failures, followed by beating up, but there are other reasons. It has been observed that the trees grow more quickly near to old rabbit warrens for here there may be deeper soil, and the rabbits have cultivated it, after a fashion. Again, the removal of patches of turf has had a serious effect upon trees planted there. Lastly, beech require a good root system to withstand the conditions of drought upon the Downs:- it may be that some of the trees planted were deficient in this respect (see Inspection Note of 29.6.39 for the Director's comments on this.)

The planting of beech through gorse deserves a mention. This was done in F.Y.33, and despite initial weeding difficulties the beech have done very

well indeed. The main site for this work was an exposed area at the top of War Down, not far from the fire tower. Rank weed growth had been killed out by the gorse before the beech was introduced. Conscientious weeding of the gorse, with the added advantage of nitrogenous exchange via the gorse root nodules, gave the beech a good start. The beech have now killed out most of the gorse. There is a tendency to fork in this crop, probably due to the absence of a nurse growing up with the beech.

An example of the re-afforestation of an old woodland area on the Downs is afforded by Hundry Copse to the north of the forest. The area originally carried beech, ash and oak over hazel coppice. The beech were ring-barked (the amenity approach restricts this procedure today), some of the ash and most of the oak were left for high cover and the hazel was cut and laid into drifts. Following this, pure beech was planted in F.Y.37. It was weeded hard in the early stages and most of the high cover was removed in F.Y.48. It is now one of the best plantations in the forest, due no doubt to the presence of forest conditions, and the superiority of high cover over contemporaneously planted nurses.

The Nurseries

There are two agricultural-type nurseries at Buriton, comprising about 11 acres. They have been used mainly for raising beech seedlings and transplants. The soil is highly calcareous, hard to work in wet weather, and liable to crack in dry.

It is intended to abandon these nurseries in the near future.

Research - Note by District Officer

Side by side with the actual forest operations, the Research Branch were laying out a series of experiments, which, in their scope must be almost unequalled in any forest area. These experiments will be the subject of a separate note. The observations upon nurse species which follow are based upon these experiments, as well as upon the information revealed during normal forest operations.

An experiment has recently been set up locally to compare the growth of beech and Scots pine, upon ploughed and unploughed areas. It is too early to make any deduction as yet from this experiment, but it is probably certain that cultivation is beneficial. Shallow cultivation is preferable

to deep upon the Downs, where conservation of moisture is an important factor.

Experience with Nurse Species

Hardwoods

Grey alder (*Alnus incana*)

Though a failure over most of Buriton it is satisfactory where the soil is relatively deep. It does not produce a valuable intermediate yield. It improves the soil.

Alnus cordata

This species is used only in experimental plots. It appears to be a hardier tree than *Alnus incana* and would probably tolerate the more exacting sites. A soil improver.

Birch

Birch is a fairly good nurse on difficult sites. It does not, however, suppress weed growth very effectively, and may whip the tops from the beech.

Lime (various species)

Lime has been fairly successful in the experimental plots, and might be tried on the less exacting areas.

Conifers

No conifer is really at home in Downland conditions, and few can be expected to survive for more than 30-40 years. This is not altogether a disadvantage, for their reduced rate of growth lessens the danger of suppressing the beech.

Larch

Larch is not a very reliable nurse, and is valueless on the really exposed sites where chalk is near to the surface. Its use should be confined to the better soils; there it may grow quite well and produce a valuable intermediate yield. In general it dies back after the 30th year.

Scots pine

Scots pine is one of the best nurses for difficult sites. It is similar to larch in dying back after the 30th year.

Corsican pine

This species is successful in the experimental plots, and would be longer lived than Scots pine on calcareous soils. It is, however, harder to

establish, and its initial rate of growth is not so rapid (See Appendix IV)

Austrian pine

This tree is probably more at home on chalky soils than any other conifer. It would prove useful as a shelter belt in the most exposed places, but Corsican pine is economically more valuable and preferable where conditions permit its use.

Thuja plicata

This species is very promising in the experimental plots, but is said to be very subject to heart rot after the 30th year.

Cupressus macrocarpa

This tree is hard to establish, but does well afterwards. Deer are rather partial to this plant.

Norway spruce

There are several groups of old Norway spruce at Buriton, and there has been some recent planting (F.Y.48). It has distinct possibilities as a nurse on the better soil types. It should be especially applicable to damp, frosty valleys. A valuable early return could be expected from this tree.

iii) Shrubs

Gorse

This is a useful nurse which kills out weed growth very successfully, and improves the soil. It is, however, difficult to weed, and constitutes a fire danger. Once the beech have overtopped it, they may fork more than would be the case had they been raised through a tree nurse. Gorse is not easy to establish, and it cannot be recommended, except where it occurs naturally.

Broom

There is a promising experimental plot of broom. It has all the advantages of gorse and none of its disadvantages. It is easier to establish, easier to weed and is less of a fire danger.

Both gorse and broom take more readily, if phosphatic manure is added to the soil.

GENERAL

More information is needed before the best nurses for a particular locality can be laid down firmly, but the following species are perhaps most reliable.

(a) Exposed conditions with poor depth of soil

Corsican and Scots pine with Austrian in the very worst sites.

(b) Fairly sheltered conditions with better soil

Corsican and Scots pine, with larch as a possible choice on really suitable areas.

(c) Frosty Areas

Scots pine and Norway spruce though the latter has not yet proved itself.

It is certain that full advantage should be taken of any pre-existing growth such as thorn, elder, yew, ash, whitebeam etc. - with or without the assistance of specially planted nurses.

Research - Note on experimental work carried out by Research Branch

Introduction

Experimental work began in this forest in 1930, and there are now some fifty experiments laid out, most of them being sited on War Down and Holt Down.

When this work was started there was already a fairly clear appreciation of the difficulties connected with the afforestation of chalk downland sites. The principal adverse factors were considered to be :-

- (i) exposure,
- (ii) the dense downland vegetation,
- (iii) shallow soils, which in combination with the above result in strong competition for water and certain nutrients,
- (iv) frost, the downland sward providing ideal conditions for radiation frosts.

These factors are not separable, and their relative importance varies greatly according to the topography and to the soils. Some mention must be made of the distinguishing features of the two principle experimental areas at Buriton.

War Down, which is the largest and most exposed of the Buriton downs, rises from 380 ft. at its southern foot to 802 ft. at its crest near the northern end. Apart from some small patches of old scrub, consisting of beech, yew, whitebeam, etc., on the flanks of the down, the whole area was formerly covered with barren grassland interspersed with a few patches of elder scrub which marks the site of old rabbit warrens. The vegetation consists largely of a Festuca grass mat, densest on the top of the down and in the valley bottom, and more sparse on the steep slopes. Calluna occurs scattered over the highest ground where the top soil is slightly acid. The soil over most of the down is a typical dark crumbly rendzina with numerous flints; this merges into chalk rubble at from 10-20 in. Even shallower soil occur on the steep side slopes.

Holt Down, which is somewhat smaller than War Down and rather less exposed, rises from 350 ft. at its southern end to 656 ft. near the northern end. Both vegetation and soil show considerable variation, much more so than on War Down. Quite a large area has been under old woodland, consisting principally of beech, ash, yew and whitebeam, and on the upper portion of the down several fields were formerly cultivated for grain crops. At the northern end quite a large area has similar soil and vegetation to those of War Down. Crowning the down are the remnants of a clay with flints cap; this consists of a deep heavy soil containing much clay and dense beds of flints. To the south of this an area of deep sandy loam with flints occurs; in places this overlies clay with flints but sometimes merges directly into chalk.

These variations have been of some importance and the site conditions must always be borne in mind when considering the behaviour of the various species represented in the experiments at Buriton.

Experimental work

The experiments at Buriton have almost all been specifically concerned with the establishment of beech, many other species have been planted, but they have usually been considered as pioneers or nurses.

It will be more convenient to discuss the experiments under their subjects rather than in chronological order; and the experiments fall into the following broad classes :-

- A. Preparation of the site, methods of planting and use of fertilisers.

- B. Type of plant, season of planting and forest extensions of nursery treatments.
- C. Pioneer crops with subsequent introduction of beech. Artificial shelter.
- D. Trials of species
- E. Miscellaneous experiments.

A. Preparation of the site and methods of planting

The object of experiments in this group is to modify the downland environment in favour of beech by direct action. Ten experiments have been undertaken, the first being laid down in 1933. They do not form a continuous series leading up to an ideal practice, and certain methods must be mentioned although they have not appeared as comparative treatments in experiments.

In 1930 the accepted method of planting was by notching into screefed patches. Experiments 1 and 2 on Holt Down (see section C), established in 1930 and 1931 respectively, were planted on shallow single furrow plough. No comparisons are available, but it can be recorded that the method was fairly successful with losses usually below 20%. In 1932, Experiment 7 on War Down was established by an unusual method. Deeply cut turves some 18 in square were inverted in the holes from which they were cut and the plants notched therein. Again this method was not a comparative treatment, and we can only say that it gave excellent survivals.

Experiments carried out in 1933 and 1934 compared notching into the undisturbed sward with notching into screefed patches. The screefing operator markedly improved the survival of the beech; for example in the later experiment survival in the screefing treatment after two seasons was 84% as against 49% for the undisturbed surface.

A logical extension of screefing to continuous bands (1941) proved rather disappointing and little if any improvement on the screefed patch. It is thought that the greater sward control was out weighed by the removal of too much top soil.

We have also certain experiments dealing with the use of bulky organic manures (Experiments 33 and 36, 1939) and leaf litter, (Experiment 45, 1947). Hop waste compost, dug in prior to planting resulted in reductions of the death rate of the order of 10% - 20%, and small temporary improvements in vigour. No clear idea of the optimum rates of application was obtained.

The 1947 experiment was initiated by the Chairman and aimed at a determination of the effects of cultivation and leaf litter in the establishment of beech. (A similar experiment has been carried out on an oak site). The treatments and results after three seasons of growth are summarised in the table below:

<u>Treatments</u>	Mean height (inches)	Percentage deaths
A-Control, notch planting in natural surface	13.9	66.7
B.1 cu. ft. of soil dug up, loosened and returned, each 4 in. layer in its appropriate stratum	14.5	32.5
C.As B, but 4 in. of litter in place of lowest 4 in. soil layer.	17.1	25.0
D.As B, but 4 in. of leaf litter mixed in the soil.	18.1	13.3
E.As B, but 4 in. of leaf litter as a surface mulch	15.5	31.7
F.As A, but 4 in. of leaf litter as a surface mulch	13.9	45.0

(6 replications)

It is clear that cultivation alone has markedly improved survival, and the mixing of the leaf litter throughout the soil has had a still further beneficial effect. This may be largely due to an improvement in the moisture retention of the soil, but the nitrogen factor must also be considered.

Considering all the above experiments in the section we get an impression of the important points in the preparation of chalk downland sites.

Sward competition should be minimised and cultivation of the soil is desirable, but this should not remove the humus bearing horizon from the immediate vicinity of the plant. Mechanical methods may be judged on their adherence to these principles.

Phosphatic and potassic manures have been applied to beech and to other species at the time of planting, but though small initial responses have been obtained with bonemeal (particularly on Thuja), there is no

evidence of any critical deficiency of these nutrients.

B. Type of plant, season of planting and forest extensions of nursery treatments.

One year beech seedlings have been compared with 1 + 1 transplants in four experiments between 1930 and 1933. The seedlings suffered no greater planting losses than the transplants, but showed a greater susceptibility to serious damage by frost and voles. In comparing plants of differing age and type the conditions must always be kept in mind, in these experiments cover had not been established, and generally speaking transplants appeared better able to cope with the difficulties of the site.

Season of planting of beech was examined over four planting seasons between 1934 and 1941. A reasonably clear result was obtained, the chances of successful establishment appear to follow this order: (best) October; November and January; February and March; April and early September.

A nursery extension experiment of some interest was carried out in 1932 on the notoriously difficult planting species Cupressus macrocarpa. This brought out the curious result that the survival of Cupressus macrocarpa can be greatly enhanced by repeated lifting and heeling in. In the best treatment included, transplants were lifted and heeled in three times, in October, December, and February. Probably the October lift has the largest effect.

C. Pioneer crops with subsequent introduction of beech

The most important experiments at Buriton are Nos. 1, 2 and 7, established in 1931, 1932 and 1932 respectively. Nos. 1 and 2 lie on Holt Downs and though they are sited on soils by no means identical, they have in common a much greater depth of soil above the chalk than is to be found in Experiment No. 7 on War Down, which is sited on a typical rendzina soil. Experiment No. 1. is sited on a remnant of clay-with-flints 'cap', but No. 2. lies on a deep sandy loam with occasional layers of flint.

The three experiments compare a number of pioneer species. There are also pure plots of beech established at the same time as the plots of the pioneer species, and the behaviour of these beech can be compared (but not strictly) with that of the beech introduced some years later in the pioneer plots.

Species used as pioneers in the three experiments were:- Scots pine,[ⓧ] Austrian pine,[ⓧ] Pinus nigra var cebennensis (Spain), Pinus nigra var caramanica (Turkey), European larch,[ⓧ] Cypressus macrocarpa, Pyrus intermedia, birch and the alders (Alnus glutinosa, oregona, incana,[ⓧ]). The species asterisked are common to all three sites. The indications are that a number of the species need not be considered further. Of these, Cupressus macrocarpa and birch are uncertain in establishment and poor suppressors of ground vegetation. Pyrus intermedia fails for the latter reason; the alders are poor on the shallow soils, and too rampant on the clays where they are difficult to manage.

Scots pine and Austrian pine are the most reliable species, and of these the latter has the advantage of longevity on the rendzinas where Scots pine may begin to die out from about the twentieth year. (Whether this signifies depends to some extent on the arrangement of the mixture. In an intimate mixture it might conceivably be an advantage).

The two other Pinus nigra varieties cebennensis and caramanica are inferior to Austrian in vigour, cebennensis being particularly unhappy on this site, caramanica is reasonably successful. It is an odd thing that true Corsican pine is not represented in these experiments, from other experience at Buriton there is no doubt that it would have been a success. In Experiment 43 lines of Corsican pine were used to separate the units and have grown very well.

European larch has succeeded on the deeper soils in Experiments 1 and 2, (in 1947 it was the tallest species in Experiment 2 with a mean height of 29 ft.), but it has been an uneven crop on the shallow soil of Experiment 7, and it cannot be recommended for general use on chalk downlands.

The pure beech in the three experiments has grown fairly satisfactorily, attaining heights of approximately 20 ft. in 20 years. It must be remembered that the plots of pure 'unsheltered' beech in these three experiments have been to some extent influenced by adjacent plots of pioneer species, and their development is not typical of extensive unsheltered beech plantations.

As pioneer plots developed a suitable degree of cover, beech were introduced; usually in groups of three about the centre of each square of four nurses. It is unfortunate that the original lay-out of the experiments did not allow for beech to be planted in the open contemporarily with each introduction. We can now only compare these introductions with the

earlier pure plantings in terms of the economy of the method and of the quality of the beech produced. It is as yet too early to make a balanced judgment, but a number of points have been noted.

- (i) Establishment failures have been rather fewer in the introductions than in the open plantings.
- (ii) Early growth of beech has been considerably faster when introduced to a suitable pioneer crop than when planted in the open.
- (iii) The form of the introduced beech, judged on the prevalence of unforked stems, is superior to that of the open plantings.

The last two points may be illustrated by the best available comparison, which is of course not an exact one, but as fair as possible.

<u>Beech planted in 1939</u>	<u>Mean height in 1950</u>	<u>Percentage of unforked Stems</u>
A. introduced to pine nurses	12 ft.	12%
B. planted in the open	5½ ft.	4%

(iv) The method of introduction to vigorous young pioneer crops which are just entering on the thicket stage is one which makes for considerable tending difficulties, producing as it does extremely intimate contact between the beech and the nursed species. All the successful pioneers have required, firstly, much branch pruning and, subsequently, early and heavy thinnings to maintain the beech in full vigour. We have no experimental comparisons with contemporary mixtures at Buriton. It is almost certain that these would be easier to manage.

(v) The stage at which introductions should be made has not been fully studied at Buriton, but we have recently underplanted (using both groups and strips) some pole stage pine crops which have fully suppressed all ground vegetation and appear to be providing ideal conditions for the establishment of beech.

Broom has been tried as a nurse for beech at Buriton, beech having been planted in 1945 in broom sowings of 1939 and 1940. There is as yet little to be said about this experiment. Certain herbaceous legumes have also been tried - sainfoin, lucerne and burnet, but no benefit was obtained from them.

The notable results obtained in an old game cover of gorse have been mentioned elsewhere in this history.

Some observation plots were laid down in 1931 and 1932 to compare the behaviour of beech planted - (a) in the open downland (b) in artificial shelter provided by hazel hurdles and (c) in the natural shelter of a small ash/hazel shelter belt.

The artificial shelter unfortunately provided ideal conditions for mice and voles which destroyed most of the beech but not before some slight benefits to the beech had been observed. The beech in the shelter belt behaved markedly better than the adjacent plants in the open, both as regards survival and early height growth, by 1936 they were twice as tall. Such results are a common feature on exposed downland wherever natural growth or plantations have modified the complex of adverse factors.

D. Trials of species

In addition to the species mentioned above, which have actually been tried as pioneers for beech, a considerable number of other trees have been planted on a smaller scale in order to get some idea of their possibilities as subsidiary species or alternatives to beech under downland conditions. It is perhaps desirable to include a full list of the species which have been experimentally planted at Buriton, though it will not be necessary to comment on the great majority of them.

xx	<i>Ailanthus glandulosa</i>	xx	<i>Parrottia persica</i>
	<i>Alnus cordata</i>	xx	<i>Phellodendron japonica</i>
x	" <i>incana</i>	xx	" <i>amurense</i>
x	" <i>glutinosa</i>		<i>Pinus laricio</i>
x	" <i>oregona</i>		" <i>nigra</i> var. <i>austriaca</i>
xx	" <i>rugosa</i>		" " var. <i>caramanica</i>
x	<i>Betula.</i> (common birches)	x	" " var. <i>cebennensis</i>
	<i>Cedrus atlantica</i>		" <i>sylvestris</i>
xx	<i>Celtis australis</i>	x	<i>Populus robusta</i>
xx	" <i>jezoensis</i>	x	<i>Salix daphnoides</i>
xx	" <i>sinensis</i>	x	" <i>caprea</i>
xx	<i>Cercidophyllum japonicum</i>		<i>Sorbus aira</i>
			" <i>intermedia</i>

	Corylus colurna		Tilia cordata
	Cupressus macrocarpa		" japonica
	Fagus sylvatica		Thuja plicata
	Fraxinus excelsior		" occidentalis
x	Laburnum vulgare, alpinum	xx	Ulmus parvifolia
	Larix europea	xx	Zelkova crenata

From this list the species with a double asterisk can be considered complete failures. Those with a single asterisk, while not complete failures, do not appear to have any application to these conditions.

Of the remainder, no specific remarks need be made here on ash, beech, Scots pine, Austrian pine and European larch, all of which are dealt with elsewhere.

Alnus cordata gives real promise, attaining a height of 29 ft. in 16 years on a quite shallow soil. It would almost undoubtedly be too vigorous a species for an intimate mixture with beech, but might well be tried in shelter belts on downland.

Tilia cordata (the small leaved lime) also shows considerable promise but is growing on a much deeper soil. In 16 years it has attained a height of 20 ft. Tilia japonica is considered to be a regional form of it, and if anything has a slightly better form of growth. The two Thujas are healthy but slow. Cupressus macrocarpa shows considerable vigour and must always be considered for shelter belts on such sites. Corylus colurna seems well adapted and might be worth further trial. Cedrus atlantica has been difficult to start, but is now growing with some vigour.

The two Sorbus species whilst well adapted to the conditions, are not rapid or efficient sward controllers. Also, being attractive to berry-feeding birds, they encourage an influx of thorns.

E. Miscellaneous and recent experiments

An experimental treatment on checked ash, carried out over the seasons 1938 to 1941, may be mentioned here. Seven year old ash plants in a state of check in a dense grass mat were hoed in continuous strips 3 ft. wide. The table below shows the response to this treatment, which no doubt acts principally to reduce competition for water and nitrogen.

	Mean annual shoot - inches		
	1938	1940	1942
Control sections	1.5	4.1	5.3
Hoed	1.9	7.9	8.1

Recent work has included a provenance experiment on beech, and experimental pruning of beech and ash. No detailed mention of these will be made as the experiments are too recent to have given any valuable information.

SUMMARY

Considerable site variations are to be found at Buriton, and of these the differences in the soils have most influenced the experimental results.

The more important results may be briefly restated as follows:-

A. Preparation of the site, methods of planting and use of fertilizers

Sward competition should be minimized and cultivation of the soil is desirable, but this should not remove what little humus there is from the vicinity of the plant.

Responses to phosphate and potash have been unimportant.

B. Type of plant, season of planting, and forest extensions of nursery treatments

Transplant stock is safer than seedling stock, more particularly under the severest downland conditions.

The best chance of survival is given by planting beech in October; November and January are also good months on the average.

C. Pioneer crops with subsequent introduction of beech

Pines have so far given the best results of the various advance nurses tried for beech in these experiments. Of the pines, Austrian has been most successful. Scots pine is good, but is apt to die early on the shallow soil.

European larch has succeeded well on the deeper soils, but is unreliable on the shallower sites.

No broadleaved species have been fully successful as nurses.

D. Trials of Species

Alnus cordata promises well on a shallow soil. Tilia cordata also shows much promise, but on a deeper soil.

E. Miscellaneous and recent experiments

Recent work includes the study of seed origin of beech, and experiments in pruning of beech and ash.

B.F.W.

M.N.

January, 1952

Conservator's Note

The prepared report is comprehensive and there is little to add but there are one or two general characteristics of beech which have not been made clear.

Intimate nursing, by alternate rows, is not satisfactory at any stage and gives no advantage which is not equally apparent with a three-line mixture. The latter, on the other hand, enables a better intermediate return and possibly a better choice of conifers if it is decided at a later date to retain some of them in the crop, since those in the middle of the three lines can be expected to survive to a much later date than any in a one-line mixture. All the time the soil conditions are improving by the beech leaf-fall and hence selected conifers may survive longer than now seems probable.

The poor, forking, fastigate type of beech so frequently seen is, I am convinced, the result of the indiscriminate collection of seed in the past from heavy bearers of bad type. I do not agree that silviculture can rectify the really bad; I think it can moderate the intermediate, and to some extent improve the character of the good.

9th August 1951

HISTORY OF BURITON FOREST

APPENDIX I

Notes from selected Inspection Reports

8/9-6-27. Technical Commissioner (Mr. R. L. Robinson)

It was decided to plant up the main area with a beech and larch 50 per cent mixture $4\frac{1}{2}$ ft. x $4\frac{1}{2}$ ft. with ash in suitable places. The ash coppice appeared to have some prospects of making a crop in many places. The ash coppice areas are to be carefully looked at before any clearing is undertaken with a view to retaining areas which show promise.

A cursory glance was taken of the adjoining "down land" on the west side of Ditcham (the Buriton Estate). As far as could be judged without actually going over the land the area appeared suitable for acquisition.

6/7-1-30. Technical Commissioner (Mr. R. L. Robinson)

Beech and larch planted P.27 and P.28 were inspected on Head Down. The result was poor. It was pointed out that these plantations had gone off considerably since the summer, the deterioration being attributed to scorching.

The general conclusion after the inspection of the downland planting was the necessity of shelter.

Trial to be made of different nurses such as Spanish and common broom, elder and willow cuttings with a view to establishing a quick growing nurse.

It was decided that unless conclusive results are obtained this season from the use of better plants and more careful planting, the planting programme must be slowed down pending further investigation in the best methods of tackling down-land. It may be necessary to establish nurses two or three years in advance of the beech or even longer. It was further considered that the proportion of beech in the present mixture, i.e. 50-50, is not high enough.

The growth of the beech and larch on the P.28 area inspected was considered fair, failures were few except at the south of the area.

The better growth was attributed to a great extent to the presence of tall weed growth which afforded protection to the plants without smothering them.

Technical Commissioner's note:-

Buriton. P.27 and P.28 are among the worst of the Commission's plantations that I have yet seen. Poor plants is one of the causes of failure but not the only one. It has to be recognised that the area is difficult and that every piece of poor work will meet with its just reward.

19-10-30. Chairman, Sir John Stirling Maxwell and Technical Commissioner
Mr. R. L. Robinson

The experimental planting of beech seedlings and transplants in elder and hazel coppice was visited. Both seedlings and transplants looked well and no signs were observed that the comparatively dense shelter was harmful, although in some parts the shelter was too dense to allow of it being left unattended for any length of time.

Technical Commissioner's minute:-

We are making progress in these areas more particularly in appreciating the importance of shelter in raising hardwood crops.

The establishment of trees on the chalk downs is undoubtedly a difficult operation calling for the exercise of great patience and care. The conditions are such that large coarsely-rooted plants or even second grade plants of the right size are almost bound to die in an average season.

Technical Commissioner's note of October 1930

The effect of shelter

1. Beech seedlings (1-yr) have survived and are of excellent colour wherever they have had any shelter. They invariably held their dark green leaves (Oct. 19th). In elder scrub and in tall ash coppice there has been scarcely a failure.
2. Beech Transplants have done equally well or better, they retained their dark green foliage and in some cases had made appreciable height growth.

On the Downs

3. In the normal planting there has been a good survival of beech (1-yr 1-yr) though many of the plants have yellow or no leaves. There was practically no growth. Failures have been greater in the larch due in many cases to the use of inferior plants. The surviving larch have made little growth.

4. In the experimental planting where all the land was ploughed (single furrow), macrocarpa is a failure. Of the advance nurses birch and grey alder have survived well and have made some growth, Austrian pine is very poor, larch as with normal planting.

The 1-year beech seedlings planted on the ridges have survived extremely well and made a little growth. Mostly they had lost their leaves and were hard to find. Transplants planted in the same way had also done reasonably well.

The furrows themselves were deeply overgrown with grass.

5. Conclusions (for the seasons in question):-

- (a) Plough, single furrow, plant 1-yr seedling beech 3 ft. apart on the sods, plant grey alder or birch 9 ft. apart as nurses. If the "take" is successful leave alone thereafter.
 - (b) Retain where possible all shelter such as thorns.
 - (c) Where 1-year beech are lacking use 2-year undercut or 1-year 1-year or later 2-year 1-year. In the case of transplants plant wider and use larch nurses.
 - (d) Use only good larch and small rather than large plants.
 - (e) We should also bear in mind the advisability of introducing a proportion of ash into these plantations when the crop begins to get away. For this, among other reasons, I would not beat up the plantations too hard. They are bound in any case to come away very irregularly.
6. In addition I would like to see a proportion of large ash (2 ft. to 3ft. high) raised for group planting or planting in sheltered positions.
7. The experiments started last year both as regards beech in sheltered places and on the downland should be continued so that a second year's experience may be gained. A supply of Sorbus aria which is the natural nurse tree on the chalk should also be raised.

31.10.31. Chairman and Technical Commissioner (Mr. R. L. Robinson)

Compartment 26

The P.30 experiment was visited and it was observed where a stronger transplant of larch had been employed it had grown well. Sir John Stirling Maxwell observed the natural flora on the Downs and expressed a wish that an area should be set aside as a reserve not to be planted. Later a favourable area which met with Sir John's wishes was located.

Compartment 27

P.31 experiment was visited and note taken of the beech shaded by wattle hurdles and in the open, also of the various species employed in experiment. Here the grey alder 1+1 transplant 12 in. - 18 in. now stood 2 ft. - 3 ft. high, making 18 in. height growth and well developed. It is therefore decided to use all available grey alder transplants that can be procured for beating up these areas in place of larch and for further planting as a foregrowth for beech. The larger transplants of larch employed in experiment have grown well.

Some beech seedlings planted in the belt of ash adjoining have failed badly owing to insufficient light.

Compartments 27 and 28

P.31 planting of Compartments 27 and 28 on furrows 4 ft. apart, beech seedlings were employed on 1 row at 2 ft. intervals; practically every plant has made good and has been retained under the light growth of weeds and grass. The small larch 1+1 employed on the other row at 5 ft. intervals having badly failed it is proposed to make good with grey alder at 8 ft. intervals.

Note by Technical Commissioner

(1) As regards the use of beech

1-year seedlings show remarkably few failures on the open downland but will not grow until nursed up by natural weed growth or nurse trees. The best method of planting them is on the upturned furrow. A single furrow is sufficient and I am doubtful whether full ploughing would give a better result.

Transplants are best where there is already some measure of shelter, e.g. coppice, thorn or buckthorn. Quite large plants can be successfully used in such situations.

This difference in behaviour suggests that we tackle yearly the areas best suited to the plants we have available.

(2) Larch is doing better than seemed probable at first (the difference at Friston is inexplicable) but it is clear that only first class plants should be used.

(3) Grey alder is very promising

(4) Beating up sporadic beech failures is not an urgent matter. Delayed replacements will rapidly catch up with the original crop because they will start under better conditions.

I think we are now getting on to the right lines - the first step was realization of the importance of utilising every scrap of shelter - and that with patience we shall build up a good forest.

28.10.32 - Chairman (Sir Roy Robinson)

In Compartment 41 (P.32), beech 4 ft. 6 in. apart in lines were planted with alternate lines of birch 8 ft. apart in lines. 35 per cent. of the birch have failed.

The Chairman said there were not nearly enough beech on the ground to make a satisfactory plantation and suggested that the birch lines be filled up with 1 beech plus 1 grey alder (4 ft. apart), i.e. beech 8 ft. apart and grey alder 8 ft. apart in the lines, with an occasional surviving birch.

Compartment 19, P.28 European larch and beech P.28, was next seen. This is a very grassy area and has been weeded this summer, the men walking through and releasing the smothered plants. After a lengthy discussion, it was decided that in the long run, it is cheaper not to weed these grassy areas, but to let them rip, and beat up in three or four years from time of planting, with big plants.

29.3.34 - Chairman

Sir Roy said that he noticed many more thorns coming in on Head Down, which was a good thing.

The ash and European larch P.30 beaten up with beech P.33 was also seen. The beech and ash are fairly good, but the European larch is poor. Sir Roy said that if any weeding were decided on, let it be hard weeding; no light weeding to be done.

27.7.36 - Chairman

A visit was next paid to the Ditcham area and the P.33 underplanted beech was seen. A good deal of time was spent on this area. The beech are splendid (less than 5 per cent. dead) and the ash coppice is rapidly improving. They have put on quite good crowns and the stems are straight and clean. The Chairman said the beech were in ideal condition and it was one of the best pieces of underplanting he had seen. If taken care of and watched, and thinned in the right way, some of the ash will grow into splendid timber.

22.11.37 - Chairman

GENERAL

It is now evident that in spite of some satisfactory plantations, the widespread planting of grey alder as an advance crop on bare downland has not met with the success anticipated and every endeavour is being made to find the reason for such failures. Bad planting and the drying out of plant roots before planting would be responsible for complete failures, but not for the dying back of the trees once they have flushed in the plantation, and a small local experiment with elder is being put in hand in the hope that this species will prove more satisfactory as a nurse crop.

As regards the areas already containing coppice the establishment of the crop presents no difficulties and the chief problem lies in the regulation of the light to the best advantage of the crop. As seen in the experimental areas, where the overhead shade has been used to kill off the grass and ground vegetation the planted crop has also suffered, and in contrast to this, areas where the overhead shade is too light results in a dense mass of undergrowth and smaller coppice which compete with the planted crop and create two and sometimes three canopies above it. It would seem, then, that in order to obtain the desired amount of light, such plantations should be frequently attended to, and lightly dealt with.

22.11.37. Compartment 17. European larch and beech P.28.

A very poor plantation with many complete blanks.....It was seen that the larch are definitely making better growth than the beech and their improvement in the past two years appears to be general throughout the area. It was noted that during the past eight years barely any thorn or scrub had come in.

....It was remarked that better results might have been obtained if Norway spruce had been used originally.

Compartment 15 Grey alder P.36

Except in the north end of the compartment where about 50% of the plants survive there is a complete failure of the crop.It was stated that, in view of this failure, it would be unwise to beat up this season with the same species, and it was suggested that, although we had no evidence to show that Norway spruce would grow here, this species should be introduced and eventually sold as Xmas trees when they had served their purpose as a nurse.

29.6.39 Compartment 24. Beech/European larch P.30.

Noted in passing. It was seen that the beech are getting away faster than the larch and that the latter have never fulfilled their object as a nurse.

Compartment 41B. Beech P.33 (in Gorse)

Since the gorse has been drifted for planting and weeding a fairly dense growth of bramble has come in but the trees appear to be coming through all right although an occasional blank was noted. The crop here is fairly regular as regards height and stocking and the trees are bearing nice healthy leaves.

All these gorse patches on the downs were originally introduced as coverts for foxes and it is probable that the the treatment was to plough and harrow the ground before sowing the gorse seed. In all probability this has some bearing on the good crop of beech. As already noted, during the inspection, disturbed soil, whether by rabbits or the plough, appears to produce a better crop of trees than undisturbed ground.

Compartment 41A. Beech P.33 (in gorse)

Rather similar to the above although the gorse is taller and the beech inclined to be more irregular in growth.

Compartments 39, 41A, 44, 43 Grey Alder P.33 and 34. Beech P.39.

Owing to the failure of grey alder as an advance crop this area was beaten up last season with Scots pine and at the same time the planting was completed with beech. At the beginning of the season the take was practically 100% but following the drought and exceptionally hot weather during May and early June deaths occurred amongst the beech and, to a lesser extent amongst the Scots. Had there been no drought these deaths

would in all probability have not occurred in spite of the bad roots of the beech. Again, it was pointed out that, had the roots been better formed, the drought would not have affected the plants so adversely. It is the combination of drought and bad roots which has caused the failure. Many plants were pulled up and it was demonstrated how tap rooted plants such as beech would suffer from a twisted root. Extremely bad cases will result in strangulation of the root and other cases will result in the tree being incapable of anchoring itself firmly in the ground so that with blowing a hole will form around the collar with the consequent drying out and death of the tree.

Several trees pulled up were seen to have been killed by ants and in one instance ants were actually found in the process of eating into the stem.

General

In the very limited time available it was only possible to obtain a rough idea of the area. An inspection of the map showed that the forest comprises four separate hills or ridges rising to 800 ft. These hills are separated from each other by valleys running roughly north and south.

Gorecombe Hole is being preserved in its natural state and will remain unplanted. Apart from this and New Barn Hanger practically the whole area is planted with the exception of a few small coppice areas on the Ditcham side. War Down was originally put under an advance crop of grey alder (P.33/P.35) and has since had Scots pine and beech introduced. Practically the whole of the remaining area is under pure beech or a mixture of beech and larch with a few ash in chosen places.

It was suggested that, in view of our experience during the past two years, the larch as a nurse are unnecessary as sample coppice and dogwood come in to serve that purpose, but against this it was pointed out that the larch would at least mean some intermediate return.

Generally speaking the coppice and old arable land areas present no outstanding difficulty and it is only the bare exposed downlands which need further study. Many problems still remain to be solved here and on the inspection it was seen that there is over a wide area an extremely rich and varied vegetation, a variable soil and a definite variation in the thickness of the turf. All these factors will have to be considered

and taken advantage of if success is to be achieved within a reasonable time. There is little doubt that once movement starts with thorn, hazel and scrub coming in the trees will move also and the problem now is how best to bring about that position.

7.7.41 - Chairman

The experimental plots in Compartments 25, 26 and 27 were seen. In 1937 it was remarked that in spite of some satisfactory plantations the wide-spread planting of grey alder as an advance crop on bare downland, had not met with the success anticipated, and every endeavour was being made to find the reason for such failures. Despite the apparent uniformity of the Downs over large areas there appears to be a considerable variation in the geological formations, and sometimes what is described as chalk is actually clay with flints. The soil varies to a wide extent, and problems of afforestation vary over a comparatively small area more than had been previously supposed.

Among the species tried as nurses for beech are Alnus cordata, the Italian alder, and Pyrus intermedia. It may be too early to judge results, but up to date Scots pine has certainly done the best. In 1940 the Research Officer observed that the former systematic interplanting of beech at regular spacing meant that the older nurses had to be systematically cut out to give the beech sufficient light, and that this had resulted in a heavy invasion of bramble. He therefore proposed to try group planting of beech in groups of 16 trees at 2 ft. x 2 ft. introducing approximately 15 groups per acre, in natural openings in the canopy and where necessary in artificial blanks caused by removing coarsely branched alders. Some of these groups were seen during the present inspection, and are doing well; in some cases more light can be given with advantage by judicious felling of the alder.

In general it was emphasized that money must be provided for weeding until the crop is established beyond doubt, otherwise the money spent on planting is thrown away. This must be regarded as a cardinal principle. There is a reservation however. This instruction does not justify heavy recurring expenditure when the crop is not worth trying to save. If there is doubt as to the condition of a plantation that has been neglected

racks should be cut here and there to see what there is to save. Where a weeding programme seems too heavy to tackle the work must be distributed throughout the year; summer weeding should be done where the growth is dense, and the hill tops reserved for winter work.

3.7.43 - Chairman

Orders were given during the Chairman's visit in 1941 to weed the plantations in Ditcham Woods after cutting racks to see what sort of condition they were in. In Compartment 1 for instance there was then such a heavy growth of weeds that it was doubtful whether the crop (beech and ash P.30) was worth trying to save. This has been done and the weeding of sample plots has shown that there was full justification for thoroughly weeding the whole area; the beech has responded to treatment and it is now decided that no further weeding will be necessary.

23-24.12.43 - Chairman

With reference to my (F.C.Best) tour report of the 28th ult. the Chairman comments as follows:-

The tour was arranged to bring out the different procedures in the successful planting of old woodlands and bare ground respectively on the chalk. There is no doubt that we have substantially solved both problems and I agree with Mr. Dalton's suggestion that we ought to publish as soon as convenient an illustrated account of our work and methods.

I am inclined to think that as regards afforesting the dips and hollows in which ash will grow but where there is always risk of frost Norway spruce will prove a better nurse than Scots pine. I would suggest a mixture of Norway spruce, ash in groups and beech, and would like to have a small area put in hand forthwith.

General

We shall presumably have to deal with a good many derelict woodlands on chalk, on which beech will be mainly replanted, and I record a few points which occur to me with regard to procedure:

1. Fell as little as possible of the upper canopy unless the material is saleable. If the young plants require more light ring the unsaleable stuff - at the right season.
2. Conserve in the upper canopy trees which show promise.

3. Clear up and burn as little as possible the lop and top; rather spread it between the rows of plants.
4. Plant strong transplants.
5. Weed the lower canopy heavily and keep it heavily weeded until the young plants are safe.

15.4.47 - Norway spruce Compartment 11. Miscombe

This little group of trees on a steep slope were seen to be going back, and Mr. Smith agreed that they should be sold. As the timber merchant Mr. Davy had in mind possessed a winch, extraction to our road above the plot would be possible without undue difficulty.

11.10.47 - Director (England) Mature Groups of Beech

The future treatment of the groups of middle aged and mature beech scattered through the forest was discussed. The Director said that in general we should not clearfell where it is possible to retain a useful crop after removing inferior trees. This removal of inferior trees may lead to natural regeneration. In planning the work in detail consideration should be given to finance and amenity as well as to silviculture.

Compartment 9 P.28. European larch/beech

The beech here are generally not of a good type, and are attacked by grey squirrels. It was agreed that though the larch were no longer required as nurses to the beech, yet because of the possibility of further squirrel damage reducing the number of good beech below that required for a final crop, and because removal at present would probably be uneconomical, they shall be left. Later they will have more volume and will be cheaper to move.

Compartment 8. P.38. Beech with Ash high cover

It should be clearly recorded that beech cannot tolerate high cover together with the competition of low coppice or other vegetation and it is always important to keep the latter cut well back all the time, while the high cover is removed gradually over a period of years.

7.6.49. Director-General.

Compartment 17. P.28. European larch/beech beaten up with Scots pine

In general the ground has been covered with a tree crop, though some bare patches remain. It was agreed that this was not a larch soil and stated by

Mr. Smith that were we to plant an area like this today, we should use Scots pine as a nurse rather than larch. Many of the larch are unlikely to grow on much longer, and Mr. Gosling said that in view of this our aim now should be to help every beech we had, even if poor in form or comparatively small.

Compartment 8 P.38 Beech

The Director-General pointed out that the beech which are under high cover are of better form than those growing in gaps in the high cover, and said that we should take care not to remove the high cover too early. It should be removed gradually as the light requirements of the beech dictate. Some patches were seen where the dogwood was over topping the beech, and those will have to be weeded.

Compartment 21. P.37 Beech

The high cover, which had consisted of mature trees had been felled and extracted during the previous winter. It was seen that the amount of damage sustained by these operations was very small. The beech had responded most noticeably to the increased light, and some very good trees were seen. Mr. Gosling, however, thought there was some doubt as to whether or not this straight growth would continue now that the high cover had gone.

Compartment 21. P.37. Norway spruce

The spruce were seen to be yellow and unhealthy looking. Examination of some which had died failed to show any trace of disease, but it was thought that the ground was drier now than when the area was planted and that this may have been due to the stopping of a spring which normally drained into the area.

Compartment 26. P.30. European larch/beech

A large proportion of the larch have been removed in the recent thinnings. Mr. Gosling said that we have now got the ground covered and in most parts of the stand a forest soil condition; we had a full crop of beech (though of variable quality): and had removed the nurses according to plan i.e. we had in a large measure achieved our original aim. By inspection it was found that there were in the ground enough good beech for a final crop.

We now have to ask; is this a good method of establishment? From the financial point of view there has been some return to offset the cost of establishment, but from now onwards there will be no further revenue for a considerable number of years.

Mr. Felton said that he thought it was a good method. He had hoped that the larch would have grown on for a further ten years or so, thus providing a more gradual incidental yield with further increment, but at least the ground is now covered and a forest floor forming, and in his opinion there will be every chance to produce a first rate crop in the second rotation.

8.12.49. Director (England)

Plants planted on ploughed ground show no signs of dying from drought and on the contrary the beech have made a very good start.

In Compartment 35 or 36 P.46. Scots pine/beech four quarter acre plots are to be selected: two on ploughed land and two on non-ploughed land. The plots are to be marked and recorded in our files. The number of trees surviving and average height growth for both species are to be assessed periodically. Notification of the existence of these plots should be sent to the Chief Research Officer, though they are to be retained under Conservancy control.

Conifer Nurses

On the areas inspected during the tour the beech cannot be influenced as yet by the presence of the conifer nurses, and hence it does not appear that the latter are beneficial in the establishment of beech outside frost areas. It may well be, however, that the beech will derive benefit from the presence of the nurses from ten to twenty years after planting, and such nurses would provide early returns lacking in a pure beech plantation. In this case the mixture need not be so intimate as 1 row/1 row; a 3 row/3 row mixture may be much more satisfactory from the management point of view whilst being as beneficial to the beech as a 1 row/1 row; mixture.

Beech areas of P.32 and similar ages.

Where limited numbers of stems are available it is justifiable to carry out a certain amount of pruning to improve their form. It has been

suggested that this can be done simply by breaking the branches concerned although the use of a saw would probably be more satisfactory. The pruning must be done with discretion: there is nothing to be gained by pruning trees which have forked repeatedly all their lives, but where trees have double leaders and both leaders appear to be maintaining straight growth, removal of one of them will improve the tree considerably. We need to select intelligent men and train them to judge each individual case on its merits. Whilst they are going through the beech areas carrying out this pruning they can at the same time see that in groups where growth is more advanced the best trees have enough room to grow. We have so few good trees that we must look after them with care.

Ash Strips in valley bottoms

In most cases there is very little prospect of a full and satisfactory crop of ash. Where these strips have been underplanted with Scots pine we should favour the latter in order to provide cover under which we may be able to establish beech at a later stage. Where there is no Scots pine but sufficient overhead cover it may be possible to introduce advance groups of beech. In both cases a number of good ash stems can be retained and pruned up. Where there are groups with a sufficiently high stocking of good stems the ash can be thinned and pruned in the normal way.

From this inspection it is apparent that in many parts of Buriton the number of good trees is small, and that there is need for careful and detailed treatment. The Forester must familiarise himself with every part of every compartment on the forest and then discuss with the State Forests Officer and District Officer the treatment of each type of crop. What we do in the next four years or so will influence considerably the final yield of Buriton's first rotation.

13.5.50 - Chairman. Experiment 7. P. 32 (beech with and without advance nurses Corsican pine/Scots pine, Austrian pine, European larch, grey alder, and Atlas cedar).

Mr. Nimmo explained the recent assessments of form which confirmed that there was less forking in the beech nursed by the pines than in the beech planted pure. Unfortunately there was no comparable open planted beech in the experiment of the same age as the nursed beech, and seed origins

also differed. It was also clear from height measurements that the rate of growth of the nursed beech was faster than that of the pure.

The comparative failure of the Atlas cedar was noticed, Pyrus intermedia planted to replace it appeared vigorous but seemed to have attracted birds which had brought in a good deal of white thorn.

Larch had been slow and uncertain compared with the pines in this shallow soil over chalk, and its canopy had not been dense enough to discourage the normal succession of woody chalk species. Alder was a comparative failure on the shallow soils above chalk.

Pines

The die back of Scots pine was noticed, this had only recently commenced, possibly the onset had been encouraged by the drought of 1949. (The Pathologist did not consider this was likely to prove a Fomes attack). The Chairman observed that it might prove convenient.

Austrian pine seemed more vigorous, lasting and denser in canopy than Corsican. (It was, however, mentioned that this sample of "Corsican" was an inferior race var. pallasiana or carsmanica from the eastern Mediterranean.

Experiment 45. P.47. (Chairman's mulching experiment, application, and placements of beech litter).

The height growth, and more markedly, the survival, of beech transplants, is best in the treatment involving the mixture of the litter throughout the loosened soil. This agrees with the indication in the parallel experiment on oak, but is probably more striking.

"Gorse Area" on crest of War Down

This interesting patch, in which beech is now in canopy and suppressing the gorse, seems to indicate the value of anything that will give some shelter and kill out the grass mat, though there may also be some "leguminous effect" involved.

Pruning of Ash

The Chairman asked that some pruning experiments be carried out in the P.32 ash in Gravel Hill Bottom.

Experiment 21. P.35 (Trial of Alnus cordata as an advance species on chalk).

This interesting plot should be thinned at an early date. It is probably somewhat light demanding and will respond best to fairly heavy thinning.

Records of yield to be kept.

Experiment 6A. P.32. (Small plot trials of various broadleaved species).

The Populus robusta is better than might be expected. The group should now be thinned, favouring the best specimen (these groups will eventually end up as single trees).

Tilia japonica is rather promising here. The groups should be thinned. It should also be ascertained what this tree is, maximowicziana? miqueliana? If the former it is a large tree in its native habitat.

Experiment 2. P.31 (Beech with and without advance nurses, grey alder, Scots pine, Austrian pine, European larch and birch).

This experiment being on the deeper soils of Holt Down, differs somewhat in its history from Experiment 7 (War Down). Grey alder grew vigorously from the start, and European larch has been very successful on its own merits as a crop.

The 'nursing' story seems much the same, however, improved form and height growth resulting from the shelter and suppression of grass.

The pure parts of the larch plots now require thinning.

In some cases, introduced beech would benefit from a little more light.

Experiment 22. P.35 (Trial of Tilia parvifolia Ehrhart. (T. cordata Miller)

This is very successful and vigorous, and casts a dense shade. However, it is rather fastigate and liable to double leaders (in this it somewhat resembles Betula lenta a tree of very similar branch angle).

The plot should be thinned this year and records of growth and yield maintained.

The Chairman observed that the chief attributes of the more successful advance nurses here were (1) the ability to give a dense canopy and suppress grasses and discourage invasion of thorns etc. (2) the provision of shelter, i.e. they must keep in advance and survive for a reasonable period. Experiment 7 (War Down) the only marked success among the treatments were the five nursed plots and the pure beech. (On the deeper soils of Holt Down the choice is wider).

It was generally agreed that the chief benefits conferred by the advance nurses lay in improved form, this being largely reduction of forking. There might be some considerable gain in height growth also, but the 'pure' beech plots were not unsatisfactory in this respect.

We did not know exactly why beech forked. It was agreed that frosting was probably one factor but by no means the only one. The Chairman was not certain whether the beech would not begin to fork more as soon as it grew clear of the nurse. If this was so, we should have at least gained something in the better form of the lower hole; but we should find out because it influenced our future management of the shelter.

We would like to see observations made on the incidence of forking at various heights under different conditions of shade etc. Mr. Macdonald thought that there would be plenty of material suitable for such studies, and if widespread enough they should carry some weight.

The Chairman also said that it was not too clear whether we were not unduly worried over forking, we were uncertain how far some of the relatively badly forked young plantations would improve in close canopy; and also how far cheap and easy remedial methods, (such as breaking or cutting off "doubles while these were still within reach), might bring the stocking of reasonable stems to a satisfactory figure. These was also the question of pruning, we did not know much about the behaviour of pruned beech, and where it appeared that there were less than, say, 150 good stems to the acre, and the plantation was not too far advanced, it might be an economic operation to treat sufficient stems to bring the choice of final crop to a reasonable figure. The behaviour of beech under pruning by various methods should be the subject of experiment. (In this connection the Chairman asked that a vigorous beech opposite the north west corner of Experiment 2. P.31 should be pruned to see what we could make of it over a period of years. It should be photographed first.)

Regarding possible inherent tendency to fork, Mr. Wood said that he thought it possible that nursery stock of 5 - 6 years might be segregated at least into the extreme classes at either end of the scale. The Chairman considered this a useful line. Mr. Macdonald mentioned that the Geneticist was working on a similar line in comparing the grafted scions of individuals. The Chairman agreed that this was a desirable method of obtaining information, but grafted stock could not meet our immediate needs, our beech planting programme must be large as it was the obvious species on many derelict woodland areas. Advances in our knowledge of the silviculture of beech might save a few million out of the £20 million or so that the rehabilitation of derelict woodlands seemed likely to cost us.

12.5.50. Compartment 6. P.33. Beech

The Chairman in giving the history of this area stated that it was the earliest area at Buriton where in an effort to reduce preparation of ground costs use had been made of the existing tree growth as cover for beech instead of complete clearing followed by the introduction of a planted nurse for beech. The birch and ash on the area had been thinned out, the hazel removed, and the whole area underplanted with beech. Lord Robinson said that it had been found by experience firstly that where this method is used it is essential to see that heavy weed and coppice re-growth are cut hard back as the beech cannot stand two storeys of shade, and secondly that good size plants should be used as small ones tend to get lost. It was seen that there are sufficient good stems for a final crop, although a considerable number of stems are of poor form, and there is an amount of squirrel damage.

The last of the high cover had been cut back eighteen months previously and it was hoped to cover the cost of the operation from the sale of produce. It was agreed that except where it was clear that a substantial profit would result from the sales of cut material it would be better to ring high cover rather than cut it. This is preferable from the silvicultural point of view also.

13.5.50. Chairman's minute

The object of my inspection was to see what could be learned from the beech experiments and in what directions we can profitably extend them and make additional enquiries.

Broadly, beech is reacting as one would expect a successor species to do. It starts best where forest conditions already exist (even such "forest" conditions as are produced by a dense canopy of gorse) and makes a favourable response to the introduction of humus into pits at the time of planting bare downland; further it reacts very favourably to partial shading.

Of the various pines, Austrian seems the best pioneer species, followed by Corsican and Scots pine in that order, but the procedure adopted at Buriton must be very costly. Unfortunately, the series does not include an experiment on the simultaneous planting of pine and beech. However, there are examples of this at Friston and elsewhere.

Apart from this inspection we had seen much that was interesting and suggestive in the two previous days with the English National Committee.

Following my Easter tour of E. (E) Conservancy I proposed a team attack on the beech problem, and I would like to have a full discussion on it early in June when I return from Scotland. We shall then want to know just what contributions can be made forthwith by the various branches - silvicultural, ecological, genetical and pathological - and secondly determine on what lines further investigations shall proceed.

APPENDIX II

Supervisory Staff

Supervision

	<u>Conservators</u>		<u>Divisional Officers</u>
1946-1947	F. C. Best	1924-1926	W. H. Guillebaud
1947-1949	A. L. Felton	1926-1939	A. L. Felton
1949-to date	R. H. Smith	1939-1946	F. C. Best
		1947-1948	R. H. Smith
		1948-to date	J. M. Ross (S.F.O.)

District Officers

Foresters

- 1932	R. G. Forbes	1928-1929	A. Rickard (Foreman)
1932-1939	G. Lowe	1929-1941	S. E. Phelps
1939-1940	C. A. J. Barrington	1941-1944	T. Hendrie
1940-1945	T. Clear	1944-1949	J. Davy
1945-1946	C. A. J. Barrington	1949-to date	H. Laney
1946-1946	J. F. Goodwin		
1946-1950	A. R. Sutton		
1950-to date	L. C. Troupe		

APPENDIX III

Buriton - Working Plan

Method of treatment decided on during visit of
Chairman and Assistant Commissioner 7.7.41.

The forest is now almost all planted up.

The older downland areas have been planted mostly with beech/European larch and sometimes with pure beech and the more recent areas with grey alder and beech. Neither nurse species have proved a success on the poorer downland areas. Subsequently the alder has been beaten-up with Scots pine and future beating-up to be with Scots pine and beech maintaining the correct proportion of nurse and main crop species. All natural growth of whitebeam, thorn and other species to be allowed to grow to help nurse the beech and when cleaning is necessary it should be kept to a minimum. Any future planting on open downland to be done with a Scots pine/beech mixture.

In places the older beech/larch mixtures are closing up and the stage is being reached when the beech need opening up. It will be necessary to brash some of the larch and gradually to remove others.

The felled woodlands have mostly been replanted with beech/larch mixture and, in accordance with the early recognized practice of raising beech, further nursing material has been allowed to grow up in the form of coppice growth and birch. Where the larch have grown well and got ahead of the coppice they will afford useful produce when removed as early thinnings but in many places they have been unable to compete with the coppice as weeding has been directed towards benefiting the beech only and this practice is to be followed.

Frequently the coppice growth is so dense and overgrown with brambles and Clematis that, although many of the beech are just above the general coppice level, some are being weighed down and deformed by Clematis. It is impossible to decide whether cleaning is necessary except by clearing short racks or cleaning sample areas. If this is done it will be possible to see whether the proportion of trees saved is sufficient to justify the heavy cost. In the larch/beech mixtures the stocking of beech is so much reduced that we cannot afford to lose many beech.

In more recent years beech has been raised under overhead shade of birch ash and oak. The success of this method rests in so reducing the light that coppice and weed growth is rendered less vigorous, while the beech has all the light it needs and at the same time protection is afforded from frost and wind and the forest soil conditions are maintained. Under these conditions of reduced light intensity it is imperative that the beech is allowed all the growing space necessary to make use of all the available light. Beech grown in this way must therefore be weeded hard from the first years and treated in the same way as a light demander. There is a tendency to allow overgrown coppice to persist and to form an intermediate canopy which must be cut right out.

The overhead shelter is sometimes too dense and needs thinning out. If a use or a sale cannot be found for such thinnings they must be ringed in the summer when the bark will run.

Single stems and groups of old beech occur in some of the young plantation and these have been practically underplanted with beech which should never have been done. A broad margin around all old beech should have been left for natural regeneration and for the removal of such old timber as may be saleable.

SUMMARY

- (1) Open Downlands. Maintain all existing nursing material whether planted or natural and augment it if necessary by further beating up with Scots pine and control it by judicious cleaning when the beech show signs of suppression.
- (2) Clear felled woodlands. When nurses in the form of planted larch, natural coppice and birch have outgrown the beech and begun to form an overhead canopy weeding must be in accordance with (3) below. Where, as is more often the case, the beech and nursing material are more or less level in a dense mass, cleaning is only necessary if enough trees to form a crop have not yet pushed through.
- (3) Felled woodlands retaining an overhead canopy. Beech must be weeded hard and no intermediate canopy can be allowed to form. The overhead canopy must be carefully regulated by thinning or summer ringing.

(Sgd) F. C. Best.
Acting Divisional Officer.
22.7.41.

Buriton Forest History

Expt. 1, P. 30.

Expt. 2, P. 31.

Expt. 7, P. 32.

MEAN HEIGHT IN FEET AT 5 YEAR INTERVALS TO 15 YEARS

	E.L.			AUST. PINE			S.P.			ALNUS OREGONA			CUP. MAC.			GRY ALDER			BIRCH			BEECH		
	5	10	15	5	10	15	5	10	15	5	10	15	5	10	15	5	10	15	5	10	15	5	10	15
Years after planting	2.7	12.0	17.0	1.8	8.0	15.0	2.2	12.0	19.0	-	19.0	26.5	-	11.0	-	4.2	15.0	20.0	-	8.0	14.0	-	5.0	9.5
EXPT. 1.	4.7	17.0	26.3	2.6	9.0	19.4	2.3	10.5	21.0	-	-	-	-	-	-	6.2	18.0	26.5	2.8	12.0	19.0	-	4.5	13.2
EXPT. 2.	2.5	7.2	14.5	1.9	6.8	14.0	2.1	7.5	14.8	-	-	-	-	-	-	2.9	6.3	10.0	-	-	-	-	3.8	8.0
EXPT. 7.	3.3	12.1	22.6	2.1	7.9	16.1	2.2	10.0	18.3	-	19.0	26.5	-	11.0	-	4.4	13.1	18.8	2.8	10.0	16.5	-	4.4	10.2

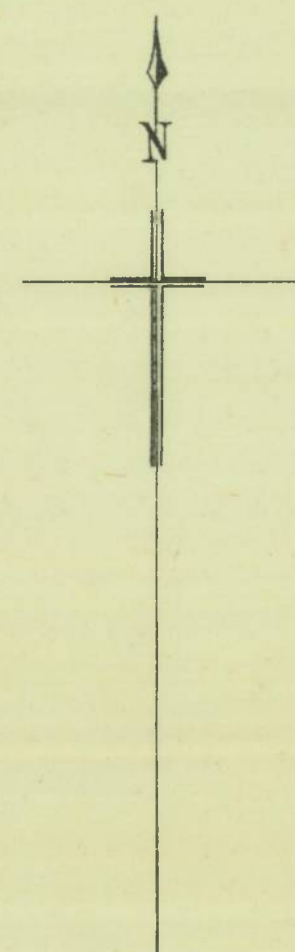
	C.P.			ASH			GOAT WILLOW			CED. ATL.			FYRUS INTERM		
	5	10	15	5	10	15	5	10	15	5	10	15	5	10	15
Years after planting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EXPT. 1.	2.1	8.0	15.2	-	3.7	-	-	-	-	-	-	-	-	-	-
EXPT. 2.	1.2	6.2	11.7	-	-	-	1.1	-	8.1	1.7	3.4	8.4	1.8	3.5	9.3
EXPT. 7.	1.6	7.1	13.4	-	3.7	-	1.1	-	8.1	1.7	3.4	8.4	1.8	3.5	9.3

Expts. 1 and 2 on Holt Down.
Expt. 7 on War Down

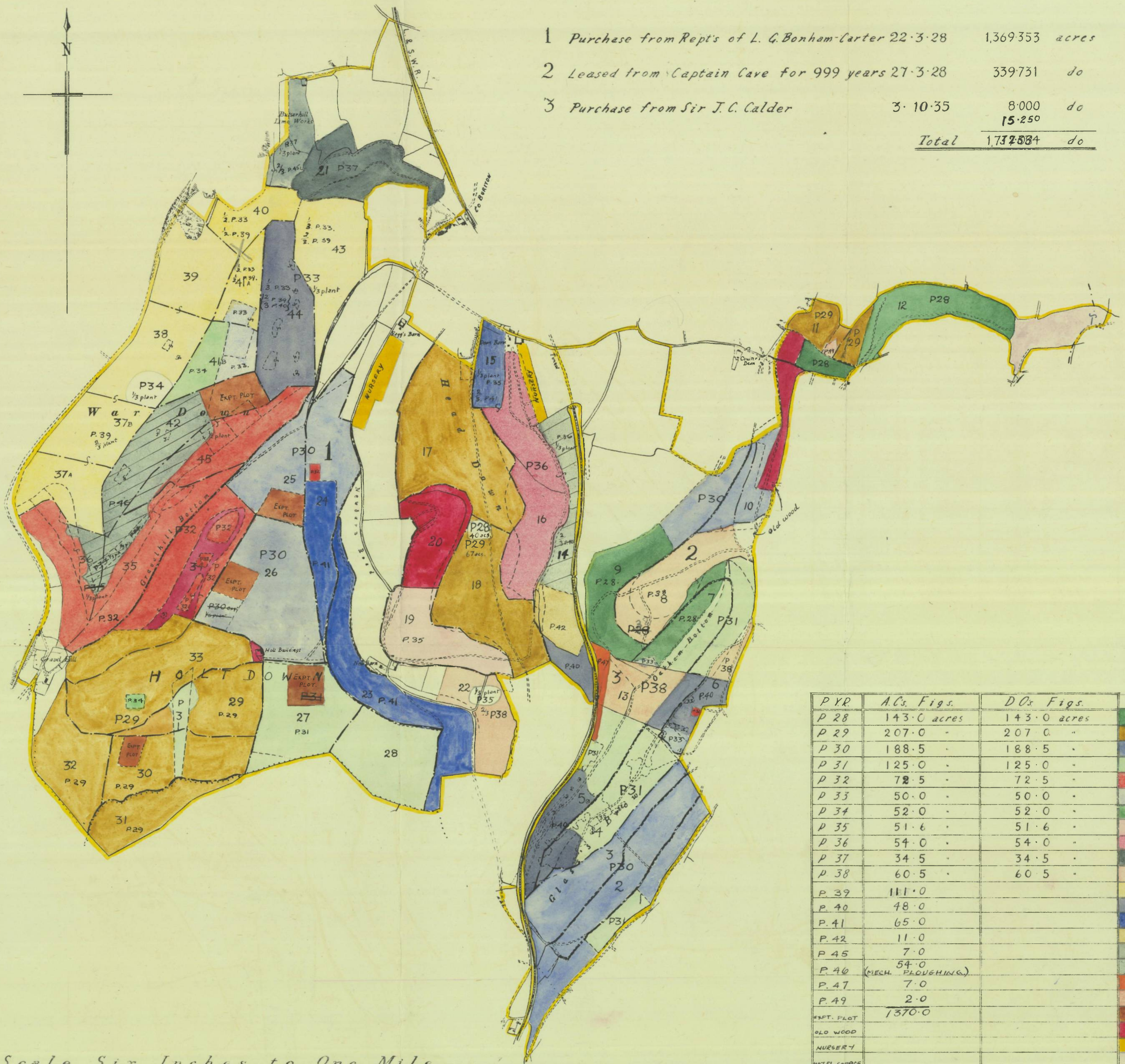
Expt. 1 - Clay Gap Soil
Expt. 2 - Deeper more fertile soil than No. 7.
Expt. 7 - Typical black rendzina soil type.



BURTON



1	Purchase from Repts of L. G. Bonham-Carter 22·3·28	1,369,353	acres
2	Leased from Captain Cave for 999 years 27·3·28	339,731	do
3	Purchase from Sir J. C. Calder	3·10·35	8,000 do
		<u>15,250</u>	
	Total	<u>1,737,084</u>	do



P.Y.R.	A.Cs. Figs.	D.Os Figs.	
P 28	143·0 acres	143·0 acres	
P 29	207·0	207·0	
P 30	188·5	188·5	
P 31	125·0	125·0	
P 32	72·5	72·5	
P 33	50·0	50·0	
P 34	52·0	52·0	
P 35	51·6	51·6	
P 36	54·0	54·0	
P 37	34·5	34·5	
P 38	60·5	60·5	
P 39	111·0		
P 40	48·0		
P 41	65·0		
P 42	11·0		
P 45	7·0		
P 46	54·0 (MECH. PLOUGHING.)		
P 47	7·0		
P 49	2·0		
EXPT. PLOT	1370·0		
OLD WOOD			
NURSERY			
HOTEL COPAGE			

Scale Six Inches to One Mile.

Agricultural & F.W.H. — uncoloured within yellow verge.

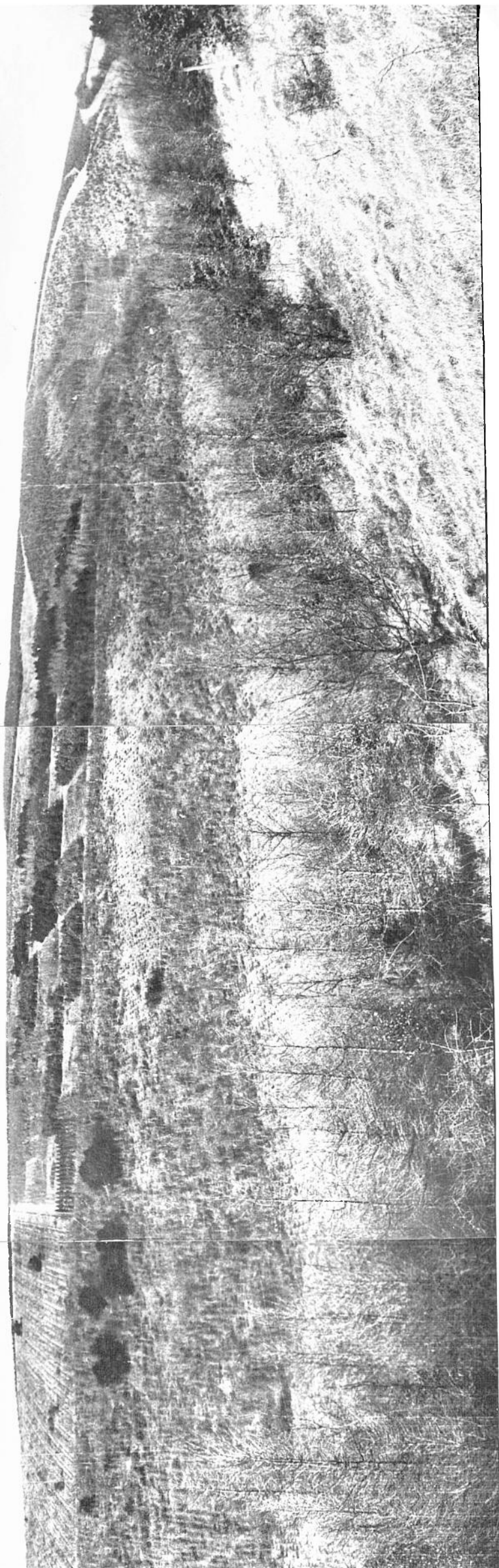
LIBRARY
I.F.No:
H.M. Forestry Commission

LIBRARY

I.F.No:

H.M. Forestry Commission

①

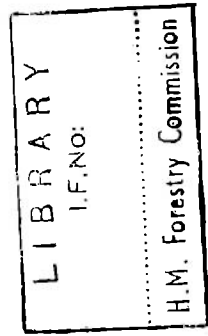


BURLINGTON FOREST: War Down from Holt Down (1949)

BURTON FOREST:

View from War Down looking
east across Faggs Barn Nursery to
Head Down Plantation (Compt. 17) -
E.L./Be., P.28.

(1951)



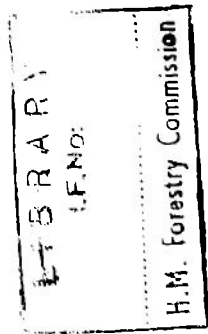
BURLINGTON FOREST:

View from E. end of Compt. 45 (War
Down) towards Head Down.

Foreground - Compt. 45 - Be. P. 32, B.U.
S.P. P. 44.

Far side of transverse ride running to
bottom right - P. 32 Ash strip.

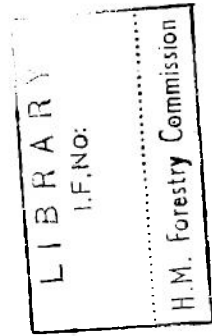
Background - Compt. 17 - E.L./Be. P. 28.



BURTON FOREST:

Looking N.E. from F.W.H. 6
(War Down). Faggs Barn Nursery
lower right with C.P. shelter
belt about 50 - 60 years old
running up hillside.

(1951)





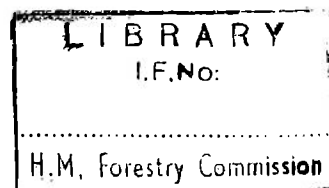
BURITON FOREST: Compt. 41.B. Be/S.P. - P.39
and right Grey Alder P.34.

(1949)



BURITON FOREST: Compt. 41.B. Experiment. Austrian
Pine - P.44.

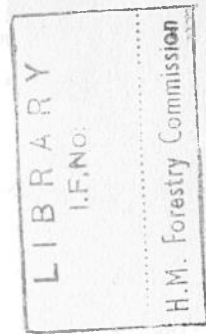
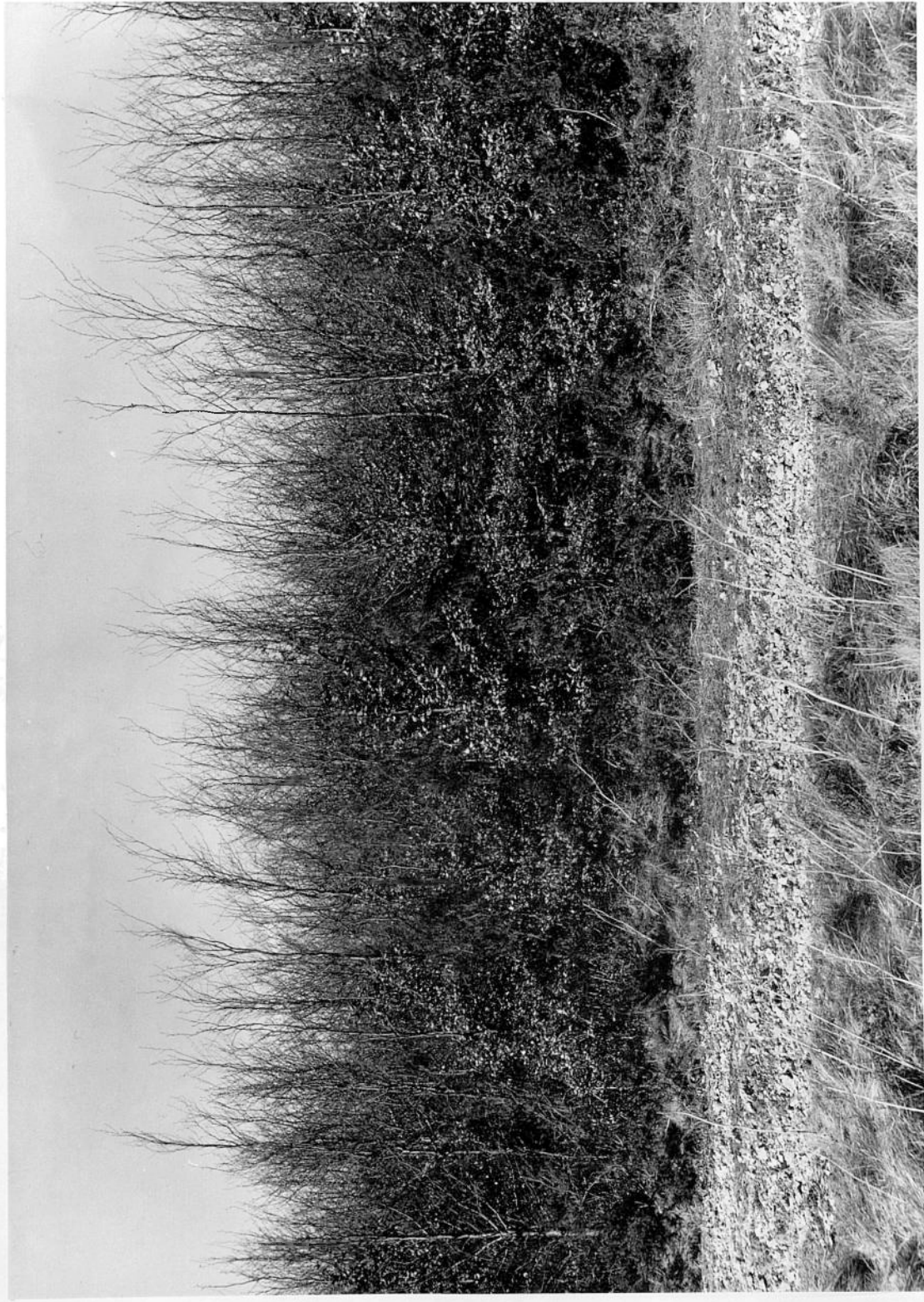
(1949)



BURLITON FOREST:

War Down: P.34 Beech raised through
gorse. The gorse has now been
killed out by the beech.

(1951)





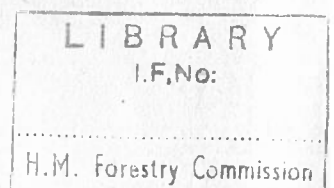
BURITON FOREST: West slope of War Down and
Butser cutting Be/S.P. P.39 with original Grey
Alder P.34.

(1949)



BURITON FOREST: Compt. 41.B. Beech P.33
planted in gorse patches.

(1949)





(above)

BURITON FOREST:

Compt. 26 - E.L./Be.
P.31 after removal
of part of E.L.

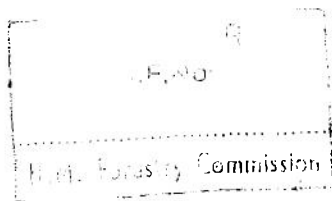
(1949)

(on right)

BURITON FOREST:

Compt. 26 - E.L./Be.
P.31 after E.L.
thinned.

(1949)

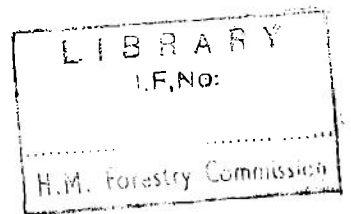




BURITON FOREST:

Compt. 21. Grey Alder P.37. underplanted
with Be 1945.

(1949)



BURITON FOREST

1

BURITON FOREST:
War Down from Holt Down (1949)

2

BURITON FOREST:
View from War Down looking east across
Faggs Barn Nursery to Head Down Plantation
(Compt. 17) E.L. /Be. , P.28.
(1951)

3

BURITON FOREST:
View from E. end of Compt. 45 (War Down)
towards Head Down.
Foreground – Compt. 45 – Be. P.32, B.U. S.P.
P.44
Far side of transverse ride running to bottom
right – P.32 Ash strip.
Background – Compt. 17 – E.L. /Be. P.28.

4

BURITON FOREST:
Looking N.E. from F.W.H. 6 (War Down).
Faggs Barn Nursery lower right with C.P.
shelter belt about 50 – 60 years old running up
hillside.
(1951)

5

BURITON FOREST:
Compt. 41.B. Be/S.P. – P.39 and right Grey
Alder P.34.
(1949)

BURITON FOREST:
Compt. 41.B. Experiment. Austrian Pine –
P.44.
(1949)

6

BURITON FOREST:
War Down: P.34 Beech raised through gorse.
The gorse has now been killed out by the
Beech
(1951)

7

BURITON FOREST:
West slope of War Down and Butser cutting
Be/S.P. P.39 with original Grey Alder P.34
(1949)

BURITON FOREST:
Compt. 41.B. Beech P.33 planted in gorse
patches.
(1949)

8

(above)
BURITON FOREST:
Compt.26 – E.L./Be. P.31 after removal of part
E.L.
(1949)

(on right)

BURITON FOREST:
Compt. 26 – E.L./Be. P.31 after E.L. thinned.
(1949)

9 (*UNATTACHED)

BURITON FOREST:
Compt. 21. Grey Alder P.37. under-planted
with Be 1945.
(1949)