XIV
COPPICE WITH STANDARDS

Fr. Taillis sous futaie, Taillis composé; Ger. Mittelwald.
In English this system is sometimes known as 'stored coppice' or 'copse', the latter being an old term. American alternative terms which have been proposed are 'composite forest', 'compound coppice', and 'sprout-seedling forest'.

1. GENERAL DESCRIPTION

Coupes and Form of Crop. Coppice with standards consists of two distinct elements: (1) a lower even-aged story treated as simple coppice, and (2) an upper story of standards forming an uneven-aged crop and treated as high forest on the principle of the selection system. The coppice is termed the underwood and the standards the overwood. The object of the standards is to provide a certain proportion of large timber, to furnish seed for natural regeneration, and in certain cases to afford protection to the coppice against frost. Coupes are formed exactly as in the case of simple coppice. The rotation of the coppice is fixed according to requirements, and the area is divided into as many annual coupes as there are years in the rotation. As each annual coupe in turn becomes due for felling, the following operations are carried out in it:

1. The coppice is clear-cut as in the case of simple coppice.
2. A certain number of the existing standards are reserved for at least one more coppice rotation, and the remainder are felled.
3. A certain number of new standards equal in age to the coppice, and preferably of seedling origin, are reserved; these are approximately of the same age as the coppice, having arisen from natural seedlings appearing, or from plants introduced artificially, at the time the coppice is cut.
4. Blanks caused by the death of stools or by the removal of standards are filled up for the purpose of ensuring a future supply of both coppice and standards; if natural seedlings are not present in sufficient quantity, plants of the desired species are introduced artificially.

If these operations are repeated regularly for several coppice
Fig. 70. Beech coppice selection system. Clump with shoots of different ages: large stem in centre about to be felled. E. Pyrenees.

Fig. 71. Beech coppice selection system. General appearance. E. Pyrenees.
rotations of $r$ years, then a coupe about to be felled should consist of coppice aged $r$ years together with standards aged $2r$, $3r$, $4r$... years, and a number of young prospective standards aged $r$ years. In other words, the rotation of the standards is a multiple of the coppice rotation. If it is decided to retain standards for a maximum of 4 coppice rotations, then as soon as the felling has been carried out there will remain on the ground standards aged $r$, $2r$, and $3r$ years, those $4r$ years old having been felled along with the coppice, and those $r$ years old having been newly reserved. This is shown diagrammatically in Fig. 72, while Figs. 73–5 show the appearance of coppice with standards in different stages. It should be

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**Fig. 72.** Coppice with standards. $a$, immediately before cutting; $b$, immediately after cutting. Rotation of coppice 25 years; rotation of standards 100 years. Numbers denote ages of standards.

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noted that the standards have shorter boles and a larger proportion of branchwood than trees grown in close-canopied high forest. This is particularly the case where the rotation of the coppice is short; with long coppice rotations the boles of the standards are usually free from side branches to a greater height.

The arrangement of coupes to facilitate extraction is carried out as in simple coppice (see p. 132). On the continent of Europe it is sometimes customary to arrange the coupes so that fellings proceed from south to north or from west to east, or in directions intermediate to these, in order to shelter the young coppice against cold northerly to easterly winds.

**Species.** The underwood in coppice with standards generally consists of a mixture of species; in England these include oak, ash, hornbeam, beech, Spanish chestnut, sycamore, field maple, hazel, alder, birch, lime, elm, cherry, sallow, and aspen, the last-
named regenerating from suckers. Areas of pure underwood of some extent, particularly of oak, ash, Spanish chestnut, or hazel, also occur. Strong light-demanders are less suitable as underwood than species capable of standing a certain amount of shade.

Standards should be of species sufficiently valuable to compensate for the loss of increment in the coppice. They should consist preferably of species with light crowns elevated some distance above the ground; coppice has a better chance of developing under such trees than under trees with heavy and low crowns. From this point of view ash, poplar, cherry, robinia, and birch are among the most suitable species, although the last-named is somewhat short-lived and is not generally of sufficient value. Many broad-leaved species are actually grown as standards. In Europe oak is the commonest standard tree. In England most of the older standards in particular consist of oak, owing largely to the fact that this tree was at one time extensively grown in this manner for ship-building timber, which required large branches with natural curves and bends for the production of 'compass timber' and 'knee pieces'. In recent years oak has suffered much from the attacks of the oak Tortrix moth, and large numbers of standards have been killed out. Beech, although occasionally grown as a standard, is not well suited for the purpose; apart from its heavy crown it is liable to sun-scorch if suddenly isolated. Light-foliaged conifers, particularly larch, make suitable standards.

Classification of Standards. The following English, French, and German terms are commonly used to denote the several classes of standards:

<table>
<thead>
<tr>
<th>Standard of rotations</th>
<th>English</th>
<th>French</th>
<th>German</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot; , 2 rotations</td>
<td>Teller</td>
<td>Baliveau,</td>
<td>Lassbaum,</td>
</tr>
<tr>
<td>&quot; , 3 &quot;</td>
<td>2nd class standard</td>
<td>Baliveau de l'âge</td>
<td>Lassreis</td>
</tr>
<tr>
<td>&quot; , 4 &quot;</td>
<td>1st &quot;</td>
<td>Moderne</td>
<td>Lasreitl</td>
</tr>
<tr>
<td>&quot; , 5 or 6 rotations</td>
<td>Veteran</td>
<td>Ancien</td>
<td>Oberständer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(de 2e classe)</td>
<td>Hauptbaum</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ancien</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(de 1ère classe)</td>
<td>Alter Baum,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vieille écorce</td>
<td>Altholz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(de 2e ou 1ère classe)</td>
<td></td>
</tr>
</tbody>
</table>

Standards of the various classes can generally be distinguished by their size, particularly if the coppice rotation is a long one, but if the underwood is composed of several species with different rates
Fig. 73. Coppice with standards. Coppice just cut, and standards reserved. Standards chiefly oak; beech standard in foreground. Forest of Louviers, France.

Fig. 74. Coppice with standards. Young coppice 4 years old. Tintern, England.
Fig. 75. Coppice with standards. Hazel coppice 10 years old with standards of oak and ash. Tintern, England.
of growth this may be a matter of some difficulty. Where there is more than one species in the overwood it is permissible to adopt different rotations for the different species, should their respective rates of growth or longevity demand it, or should the size of material required in the case of each differ appreciably. Thus in the Town Forest of Rastatt in Baden, with a coppice rotation of 25 years, the rotations adopted for the standards are oak 125 years, ash 100 years, birch, alder, and hornbeam 75 years, poplar and robinia 50 years.

**Distribution, Reservation, and Removal of Standards.** It is usual to fix approximately the total number per acre of standards of all classes to be reserved at the time the coppice is cut. More rarely the volume per acre to be reserved is laid down, this varying with different qualities of soil: as a rule this is applicable only where the crop consists mainly of standards, and approaches selection high forest in character. The number or volume of standards to be reserved depends on the relative importance of the overwood and the underwood. Every additional standard means a corresponding reduction in the outturn of coppice; hence by fixing the number of standards an approximate ratio can be maintained between the outturn of timber and that of smaller material. As a general rule between 20 and 40 standards per acre of all classes are reserved; with more than 40 the coppice, unless strongly shade-bearing, is relegated to a secondary position.

Attempts have been made to maintain the balance between coppice and standards by ascertaining the average space occupied by the crowns of standards of each class, and using the total crown space per acre as a measure of the relative importance of the standards; thus if coppice and standards are to be of equal importance, theoretically the total crown space of the standards should occupy half the area, though actually a good deal will depend on the shade-bearing capacity of the coppice. In practice this method is not so reliable as it might appear, owing to the number of different factors which operate.

As a rule the standards are scattered singly over the area, but sometimes they are concentrated in groups distributed amongst the coppice, or in belts with intervening belts of coppice, an arrangement which produces a larger proportion of clean timber in the standards.

In order to ensure sustained yields, attention has to be paid to the correct age distribution of the standards. Just as in the case of the selection system, allowance should be made for mortality
among the immature standards or for their removal on silvicultural grounds; for instance, for every ten to twenty tellers reserved only one or two may survive to become standards of 4 rotations. The rate of mortality will vary under different conditions, and the average for any locality can be determined only by experience. As an example, assuming that 40 standards per acre are to be maintained, the proportion of these, immediately after the coppice is cut, might be somewhat as follows:

<table>
<thead>
<tr>
<th>Rotation</th>
<th>Number of standards per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>20¹</td>
</tr>
</tbody>
</table>

¹ Just reserved. ² Just removed.

Standards for reservation are generally marked with a ring of paint at breast-height, and all trees and coppice shoots not marked are felled. If there is any risk of fraudulent felling special precautions are taken, such as the serial numbering of the standards, the preparation of a descriptive list, and the hammer-marking of the trees at breast-height and also near ground-level. In Belgium a method adopted to prevent fraud is to mark only the tellers with paint, as they are of comparatively little value, and then after the coppice is cut to place hammer marks on the standards to be felled.

The selection of standards for reservation, termed ‘storing’ in England, should take into account (1) the average number of standards per acre to be reserved, (2) their distribution over the area, (3) the selection of good straight sound specimens of the best species with well-developed but not too spreading crowns, and (4) the maintenance of a correct proportion of classes. The felling of standards is not confined to those which have reached the exploitable age; it includes also the removal of younger standards which are dead, moribund, diseased, or otherwise undesirable, and it may even extend to the removal of sound standards which are in excess of requirements. In exceptional cases even standards which have reached the prescribed exploitable age may be retained for another coppice rotation if they are of specially fine quality and are likely to increase materially in value. It is not always possible to find suitable standards distributed evenly over the area; the prescribed number per acre should therefore be regarded rather as a general average than as a hard and fast figure applying to each acre of forest. Some authorities advise reserving more than the
accepted number almost without limit, if good standards can be found. This, however, ignores one of the main objects of the system, which is to supply a certain proportion of small material; if the object is to produce as much large timber as possible then coppice with standards should be abandoned in favour of high forest. In France it is sometimes the custom to reserve a larger number of standards along the forest boundaries, as a protection against strong and dry winds, and near roads and tracks, in order to reduce the cost of extraction as well as for aesthetic reasons. Where frost damage is severe, it is sometimes the custom to reserve a large number of tellers to protect the young coppice shoots from damage; as soon as the risk is past these tellers are thinned out to the required number.

Standards should, if possible, be of seedling origin, since coppice shoots left standing for a long time tend to become unsound at the base. Where there is a deficiency of seedling trees, however, it may be necessary to reserve selected coppice shoots as standards; these should be chosen if possible from young stools with few shoots on them. Suckers are preferable to coppice shoots, owing to the absence of any wound at the base.

Standards should be felled and removed immediately after the coppice is cut, in order to avoid damaging the young coppice shoots after sprouting takes place. For this reason if oak standards are stripped for tan-bark, this should be done during the spring before felling takes place, the barked trees being left standing until the following winter.

**Tending Operations.** These comprise cleanings and thinnings and, where necessary, the pruning of standards. Early cleanings include the removal of inferior species, weeds and climbers which are threatening coppice shoots and seedling plants, and also the removal of coppice shoots which are interfering with seedling plants required for the future supply of standards; the latter is an important operation owing to the more rapid growth of the coppice.

Thinnings among the coppice shoots are carried out in the manner already described under simple coppice. In addition, thinnings include the freeing of young prospective standards from coppice shoots which threaten them as well as the removal of dead and dying standards and those whose removal may be otherwise desirable, in so far as this can be done without serious damage to the crop. The pruning of standards may also be carried out with the object of producing clean boles. This operation includes the removal of epicormic branches, which sometimes appear after the
coppice is cut, and other small branches; the removal of large branches may induce decay.

Where young standards are reserved in specially large numbers for the protection of the coppice against frost, these standards require to be thinned out, when the coppice is free from danger, to the number ultimately required; this may be carried out in one or more operations.

2. SPECIAL FORMS OF COPPICE WITH STANDARDS
Among modifications of the usual form of coppice with standards two may be specially mentioned: (1) coppice with coniferous standards, (2) coppice of 2 rotations.

Coppice with coniferous Standards. This consists of coppice with an open uneven-aged overwood of conifers worked on the selection system with a felling cycle equal to the coppice rotation. It is exemplified in some of the mixed forests of holm oak (*Quercus Ilex*) and Aleppo pine (*Pinus halepensis*) on the dry limestone hills of the Mediterranean coastal region of France. The oak is worked as coppice, the rotation being as a rule 25 years. The pine, which is subjected to resin tapping, is worked under rough selection fellings with a minimum exploitable girth limit which varies with the locality; the rotation is not fixed, but may vary from 3 to 5 coppice rotations. Natural regeneration of pine is relied on as far as possible, but supplementary sowing or planting is often necessary.

Coppice of two Rotations. This, in a sense a modification of simple coppice, has for its object the production of a certain proportion of large-sized poles in addition to poles of ordinary size. Coupes are laid out and treated after the manner of simple coppice, but at the time the coppice is cut a few selected shoots are left scattered singly over the coupe in the form of standards; these remain standing for a second rotation in order to attain specially large dimensions. Next time the coppice is cut these standards are felled and new standards are selected from among the coppice shoots of one rotation. In some cases whole clumps of coppice shoots are left standing for two rotations.

In France this method appears to have been commoner at one time than it is now. It is still followed in many of the chestnut coppice areas of Italy. Here the ordinary rotation varies from 10 to 30 years, with periodical thinnings beginning at about 6 years, and the produce consists, according to size, of vine-stakes, bean-

1 A coppice shoot left for a second rotation is termed in French *volelire* and in German *Niederwaldüberhälter*, the system being known as *Niederwaldüberhältsbetrieb.*
sticks, posts, and poles, as well as firewood and charcoal; the shoots of two rotations furnish telegraph and telephone poles, railway sleepers, and even timber for sawing.

3. INTRODUCTION OF COPPICE WITH STANDARDS IN IRREGULAR HIGH FOREST

The conversion of irregular high forest to coppice with standards is well exemplified in many of the mixed deciduous forests of India, and the procedure followed may be usefully employed in other countries where a local demand for firewood and small timber has to be satisfied. Forests of the type in question contain trees of various sizes and species. In introducing coppice with standards the coppice rotation is fixed according to requirements and the area is divided into the necessary number of annual coupses, one of which is taken in hand each year. The number of standards per acre is decided on, together with their allotment to size-classes based as far as possible on the estimated average rate of growth in girth or diameter. The standards to be reserved are marked according to this scheme, and everything else is felled.

As an example, assuming that the coppice rotation is 25 years, that the rotation of the standards is 100 years, and that 30 standards per acre are to be reserved, the following table may be taken to represent the distribution of standards over one acre:

<table>
<thead>
<tr>
<th>No. of coppice Rotation</th>
<th>Theoretical age in years</th>
<th>Corresponding diameter-class (roughly estimated)</th>
<th>Number of standards to be reserved</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>25</td>
<td>up to 8</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
<td>9-16</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>75</td>
<td>17-24</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>100</td>
<td>over 24</td>
<td>all felled</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>30</td>
</tr>
</tbody>
</table>

This arrangement makes a rough attempt at distributing the standards according to classes at the outset, although an accurate distribution will not be possible until four coppice rotations have passed. If trees of the various size-classes are not available in the required numbers, it may be necessary to allow more latitude in the distribution of the standards among size-classes, and in places even to retain standards above the maximum diameter limit.
4. ADVANTAGES AND DISADVANTAGES OF COPPICE WITH STANDARDS

The following are the chief advantages and disadvantages of the system of coppice with standards:

ADVANTAGES. 1. It furnishes material of different sizes in considerable variety, and is therefore suitable for the supply of a local demand for various classes of produce.

2. It furnishes early returns from the coppice, which is a financial advantage.

3. The forest capital is small compared with that of most forms of high forest, and it can be readily increased or decreased without affecting the system, a fact which tends towards elasticity; this is an advantage in the case of private properties.

4. Owing to the cover of the standards the soil is better protected than in the case of simple coppice.

5. Replenishment of blanks is not carried out wholly by means of artificial regeneration, as in the case of simple coppice, but is effected, in part at least, by natural regeneration from seed, which reduces expenditure.

6. Aesthetically it is superior to simple coppice, since clearfellings are avoided, and the overwood consists of well-developed trees of different sizes.

7. It is a good system for game preserves, owing to the cover afforded by the underwood.

DISADVANTAGES. 1. It is a difficult system to apply correctly: the maintenance of the balance between coppice and standards, and the correct distribution of standards of different classes, are matters of considerable difficulty; the selection of standards requires skill and is a tedious and troublesome operation to carry out amidst a thick growth of coppice through which it is difficult to see any distance.

2. Standards in coppice with standards are more branchy and shorter boled than trees grown in high forest, and consequently yield a smaller proportion of clean timber; under this system the amount of small material, including branchwood, may amount to as much as 75 per cent. of the total outturn, and much of this is fit only for fuel.

3. Coppice grown under standards is generally less vigorous than simple coppice.

4. The harvesting of the produce requires more labour than in the case of high forest for equal volumes of outturn—Huffel puts
it at 4 to 5 times the amount—for which reason the working of this system has become unremunerative in many places.

5. So far as liability to external dangers is concerned, the following may be noted:

(a) the coppice suffers from the browsing of deer where these animals are prevalent;

(b) young standards suddenly freed from the intervening coppice are liable to be bent or uprooted by wind and snow, although the older standards, owing to their individual development, are wind-firm;

(c) smooth-barked standards, when exposed, are liable to sun-scorch;

(d) in the abnormal drought of 1907 and 1908 in northern India coppice with standards suffered more than high forest, the standards in particular being killed off by drought owing to the desiccation of the soil which followed the periodical felling of the coppice.¹

Attempts have been made from time to time to compare the volume outturns from coppice with standards with those yielded by high forest. It is impossible, however, to arrive at a definite conclusion in the matter owing to the lack of comparative figures relating to identical species and localities of a similar character; a further complication is introduced by the fact that differences in the rotation may have a decided effect on the outturn. Statistics are available showing the outturn per acre yielded by high forest and coppice with standards respectively over a series of years in whole countries or specified districts. These show a higher outturn sometimes in the one case, sometimes in the other. Such figures are admittedly unreliable, for apart from the difficulty of making a fair comparison, for the reasons just mentioned, coppice with standards in Europe is confined as a rule to the more favourable localities, whereas high forest is often situated on less productive ground. As a rule, therefore, comparative figures are unduly favourable to coppice with standards.

The question of total outturn, however, is of small importance compared with that of the respective value of coppice with standards and high forest in the general economy of a country. From this point of view high forest is greatly superior in that it furnishes a much higher outturn of timber, as apart from firewood. At the present day firewood and charcoal do not possess the importance

which they once had, and in many localities they cannot find a remunerative sale; on the other hand everything points to an increased future demand for timber. As long ago as 1872 Tassy\(^1\) estimated that the annual loss to France, by reason of her large areas of coppice and coppice with standards—the latter predominating—amounted to 293 million francs (£11,720,000 nominal). During the war of 1914–18, when enormous demands were made on the forest resources of France, the inadequacy of coppice with standards as compared with high forest was amply demonstrated.

It is now generally admitted, therefore, that coppice with standards is inferior to high forest without possessing the advantages of simple coppice; it is held that if timber is required it should be grown in high forest, while if firewood and poles are wanted simple coppice is preferable to coppice with standards.

5. APPLICATION OF COPPICE WITH STANDARDS

**Historical.** Coppice with standards, although not so ancient a system as simple coppice, has been practised in one form or another since the Middle Ages. In England there are records of its having been worked since the twelfth century in Melton Constable Park, Norfolk. Later on prescriptions for the reservation of standards appear in the statutes. In a series of statutes for the preservation of woods, which began in 1544 with Statute 35 Henry VIII, c. 17, it was laid down, chiefly in connexion with coppice woods, that twelve standards per acre should be retained. The same prescription appears later, as when in the early part of the seventeenth century James I commanded that in the New Forest ‘twelve standels be left in every acre’. In a maritime country like England coppice with standards was of special importance in the days when branchy oak timber was much in request for the construction of naval and other vessels.

On the continent of Europe the system is of very long standing. In France it has been extensively practised since the Middle Ages. In Germany coppice with standards appears to have been practised in some form from about A.D. 600; in those days it was combined with the pasturage of cattle and swine, for which reason the standards consisted of food-yielding trees such as oak, beech, and fruit-trees, while the underwood was cut periodically to furnish fuel. This practice persisted throughout the Middle Ages, and is occasionally seen even at the present day. In the forest ordinances

of Germany there were prescriptions regarding the reservation of standards, an operation which seems to have been carried out in a systematic manner at least as early as the sixteenth century. In the broad-leaved region of Middle Europe this system was at one time far more prevalent than it is now. In Switzerland coppice with standards was practised fairly widely up to the middle of last century, since when large areas have been converted to coniferous high forest, mainly of spruce.

**Present-day Conditions.** It will be of interest to consider the present-day position of coppice with standards in some of the countries in which it is practised.

**Great Britain.** Until comparatively recently coppice with standards was the principal system applied to hardwoods in Great Britain. In the days when oak was much in demand for shipbuilding and there was a good sale for firewood the system was a highly profitable one, and it was worked scientifically with attention to the correct distribution of standards. With the industrial development of the country, the more extensive use of coal, and the construction of railways which distributed coal over the country, the demand for firewood, particularly in towns, diminished or ceased altogether; further, with the introduction of iron ships in the middle of last century the demand for oak timber for shipbuilding began to decline rapidly. In consequence the importance of coppice with standards has greatly diminished, and in many places there is little or no sale for the produce. It is not surprising, therefore, that in recent times the proper reservation of standards has often become neglected, and many British woodlands formerly worked as coppice with standards have degenerated into irregular scrub of little or no value. Many private owners hesitate to convert such woods to high forest owing to the cost involved, while others are undertaking conversion with a fair degree of success. So far as State enterprise is concerned, the Forestry Commission has undertaken a considerable amount of conversion of derelict coppice with standards to high forest. In spite of its disadvantages under present-day conditions, the system is likely to continue to some extent on private estates, partly in the form of game preserves and partly to furnish supplies of timber, firewood, fencing, and other small material for estate purposes and for local consumption in rural districts. There are still a number of small local industries dependent on this type of forest.

The latest forest area figures for Great Britain are those obtained from the census of woodlands carried out by the Forestry Com-
mission in 1924. These show the following areas of coppice and coppice with standards combined, the latter forming the great bulk of the area:

<table>
<thead>
<tr>
<th>Area in acres</th>
<th>Percentage of total forest area</th>
</tr>
</thead>
<tbody>
<tr>
<td>England</td>
<td>485,224</td>
</tr>
<tr>
<td>Scotland</td>
<td>8,120</td>
</tr>
<tr>
<td>Wales</td>
<td>35,331</td>
</tr>
<tr>
<td>Total in Great Britain</td>
<td>528,675</td>
</tr>
</tbody>
</table>

France. Of all continental countries France has been the most conservative as regards the retention of coppice with standards. At the present day almost all the private and communal broad-leaved forests, about 35 per cent. of all the forests of the country, and more than half of all the broad-leaved forests, are treated under this system. In France, as in England, coal has superseded firewood to a large extent in towns, though there is still a good demand for firewood in rural districts; coppice with standards has therefore lost much of the importance which it once possessed. Its general application in private and communal forests at the present day is due partly to its utility in supplying local demands for firewood and other small material, partly to a disinclination to face the expense of conversion to high forest, and partly no doubt to popular prejudice. In State forests, on the other hand, it has long been felt that this system is not a suitable one; the duty of the State, it is held, is to grow large timber, the production of small material being left to private enterprise. For this reason in the State forests of France the conversion of coppice with standards to high forest has proceeded actively, with occasional intermissions, for the past 100 years. At the present day it may be said that all State forests formerly worked under coppice with standards either have been converted to high forest or are undergoing conversion if this is at all feasible. In no country can conversion to high forest be better studied than in France, where an elaborate technique has been developed. Germany. In Germany coppice with standards was at one time far more widely practised than it is now. Since the early part of the nineteenth century the area under this system has diminished steadily, Saxony having led the way in conversion to spruce high forest. In State forests it has now disappeared almost entirely throughout Germany. Recent figures show only 3.8 per cent. of the total forest area under coppice with standards, chiefly in the communal forests of western and south-western Germany.
Switzerland. Since the middle of last century large areas of coppice with standards have been converted to high forest; recent figures show 3.5 per cent. of the total forest area under this system, but the area is steadily diminishing. Coppice with standards, which still plays an important part in private forests, is practised mainly in moist river valleys and near lakes, often on land which is periodically flooded.

India. In India coppice with standards is an important system for the local supply of firewood, house-posts, and other small material for village requirements. It is much practised in forests which are incapable of producing timber of large size, and it is also the system employed in the extensive irrigated plantations of the Punjab. In 1923-4 12 per cent. of the area of State forest under systematic management in British India, representing 6,855 square miles, was worked under this system.

Conditions of Application. Coppice with standards is applicable only where there is a good local demand for firewood and other small produce as well as some demand for larger timber. In general, therefore, it is suitable for private and communal forests of comparatively small size in readily accessible situations, and not for large State forests at a distance from local centres of consumption. In Europe it is regarded as a system suitable for mild climates and fertile or at least moderately fertile soils, the rich alluvial soils of riverain tracts being particularly favourable; it is not adapted for severe climates and poor soils. In India, however, it is generally practised in the poorer types of forest, where conditions of soil and climate are unfavourable for the production of high forest of good quality.

In Europe the economic conditions which once favoured the general employment of coppice with standards have altered, and the system has had its day; the future should see a steady diminution of the area under this system in favour of high forest systems.

The technique of conversion to high forest is described in the next chapter.