

Owing to the extensive manufacture of charcoal, roads for the carriage of timber were less necessary on the Harz than elsewhere, and this circumstance still places some of the Harz forests at a disadvantage.

In the construction of such roads at present, the gradient varies between 3 and 6 feet in 100.

SILVER FIR AND SPRUCE FORESTS OF THE BLACK FOREST.

As suggested in the memorandum for the guidance of forest officers, I visited the Black Forest mountains with a view of seeing the management of the silver fir forests on those mountains, and the transport of timber, as far as such could be of use to me in India hereafter. For this purpose I went to the Forstrevier Rippoldsau, the adjoining districts of the State forests of the Grand Duchy of Baden, and the Freudenstadt forests in the kingdom of Württemberg. Black Forest mountains.

On my return from there to Hanover, the forests on the Hauptsmoor, near Bamberg, in Bavaria, where the natural reproduction of the Scotch fir is managed very successfully, were also visited.

The Black Forest mountains are one of the homes of the silver fir, the forests of which, near Rippoldsau, are situated between 2,000 and 3,000 feet, and therefore at an average height of 2,600 feet above the sea. The silver-fir forests.

The winters are severe, with an average depth of three and a half feet of snow in the valleys from December until March, whilst on the hills the average depth of snow is five to eight feet from the beginning of November until the middle of April.

They are partly regulated forests, in which, however, a gradual felling for the natural reproduction of them is carried on over one-fourth or one-third of the whole area at once, from which every year during a period of 30 or 40 years the largest trees are removed, whilst the rest are allowed to grow to a larger size during the remaining years. This is done as the price these large trees fetch is much higher in proportion than that of smaller ones, and all are felled and removed in one piece if possible. Management.

Natural reproduction is chiefly resorted to in these forests, which, in consequence of the young plants growing well in the shade of the old trees, is very easily accomplished, even though it is extended over such a long period as thirty or forty years. Natural reproduction.

To be able to keep as many trees as possible growing on the lands on which the regeneration of the forest is going on, the branches up to one-third or two-thirds of the height of the tree are sawn off to admit air and light for the young plants, which does no harm to the silver fir, but, on the contrary, is said to aid the more rapid increase of the trunk, whilst the branches are used for litter. This sawing off of the branches is commenced from above by men who climb up the trees, and who earn from 1s. 4d. to 2s. a day.

Regular seed-bearing seasons occur at longer or shorter intervals, but nearly every year there is sufficient seed to increase the number of young plants where it is wanted. Moss cover is very favourable for the germination of the seed, whilst such places which get covered with grass or weeds, or where for other reasons the seed does not germinate freely, the soil is at once prepared, by clearing and slightly loosening it in strips or patches, for the reception of the seed, the germination of which is thus facilitated. If, the open space in the forest is so large that the seed from the old trees does not reach the whole of it, sowing by hand is resorted to early, so as to let the young plants be as nearly as possible of the same age. If, by the time the old trees are nearly all removed, there are still some parts not yet covered with young trees, planting is resorted to. Aiding of natural reproduction.

For the better growth of such planted trees the existing groups are somewhat rounded off, to avoid the young trees planted having to struggle with the others, perhaps already twenty to thirty years old; and where, on incompletely stocked spaces, which have to be filled up by planting, there are single trees of some twenty to thirty years, they are cut down altogether; or, if they are standing in numbers, and are not quite so large, some of the lower branches are lopped off the outer ones, so as not to interfere with those planted. These plants are either taken from nurseries or out of the forest, if the latter have not grown in too deep shade, which would render them liable to suffer on being removed into open places.

The seed is collected with some risk from the trees in October, before the cones open and it falls out. As the seeds are very oily they are best kept in the cones or sown at once. The sowing is done on prepared beds in rows four inches apart, and after germination the ground is covered with moss to keep the moisture in the ground. The seedlings one year old are transplanted into rows six or seven inches apart, and three inches between the plants in the rows, after which the soil between them is also covered with moss. Here they have to remain for two or three years before they are fit for transplanting. Shade from the side is very beneficial for the seed beds as well as for the nursery. Plants from the nursery are preferable to those out of the forest, and the latter, when used, are as a rule removed with some of the soil adhering to the roots. Collecting of seed and nursery management.

Planting is better done in spring than in autumn, and in the usual way, the roots of the young plants being cut as may be necessary. They have to be sheltered as far as possible against sun, dryness, or spring frosts, and the plants as a rule thrive better on the cool northerly and easterly slopes of the mountains than anywhere else. The silver fir grows very slowly at first, and does not get much higher than six inches within the first four or five years. At the age of twenty-five years it begins to grow very fast, and increases most between the age of 80 and 120 years. It likes best a deep, cool, moist, and loamy soil, with a covering of moss on it, and sends its roots deeper than the spruce, in consequence of which it suffers less from the wind and storms than the latter. Planting.

On southern slopes of the mountains it sometimes fails, or only partly succeeds, and then Scotch fir is planted to fill up the space. The latter grows in such localities here in the mountains very luxuriantly, and to a great size. A number of spruce are sprinkled through the forest nearly Other trees with the silver fir.