

At Westerhof, I went over the Government seed-drying kiln, for getting the spruce seed out of the cones and cleaning it of wings, which is carried on here on an extensive scale, the spruce being plentiful, of excellent growth, and producing exceptionally good seed. Seed-drying kiln.

The cones are collected by contract work, and the payment varies according to the seasons, if plentiful or otherwise, and generally enables the workman to earn from 2s. to 3s. a day.

After all the Government stores are filled, private persons are allowed licenses to collect, for which each person has to pay 1s. a season.

In the cones the seed remains good for seven to eight years.

When the kiln is being worked, about 60 bushels of cones are dried out in a day, of which each bushel gives about 1·2 pounds of clean seed, without the wings on the seed.

The Government kiln turns out about 180 cwts. of clean seed yearly, whilst private parties in good seasons have turned out as much as 1,600 cwts. besides.

The cones, when first brought in, are stored in large rooms with perforated walls, so as to admit a free current of air through them.

The kiln itself consists of three rooms, the centre one of which is heated by means of a large oven, from which large iron pipes, about 6 inches in diameter, are passed twice through the room before they lead into the chimney. This room is separated by walls, in which there are holes 9 inches from the two outer rooms, in which the cones are being dried. By means of these holes, which can be closed at pleasure, the temperature in the drying rooms is regulated, and kept between 122° and 128° Fahr.

The drying is done in large wire drums, out of which the seed falls on to the floor of the room. The drums are made so that they can be turned from the outside of the drying room, where it is cooler. Each of the drying rooms contains 12 drums.

These drums were first filled in the evening, and the temperature got up to about 128° Fahr., and left so for the night. The next morning, when some of the seed had fallen out, the fire was lighted afresh, and the temperature got up again to the same heat, the drums being turned every half hour, in consequence of which the seed dropped out and left the cones empty by night.

One half of these empty cones are required for firing the kiln, whilst the other half are sold as fuel.

The cost of the cleared seed is about 3d. per pound to Government, at which rate the seed is distributed, whilst the seed not required by Government is sold to the public at the rate of 4½d. per pound.

Although the spruce is frequently seen in the plains and on some of the hilly parts of the province of Hanover, its head-quarters are the Harz Mountains, where it does well up to an elevation of 2,500 feet above the sea. Its wood is chiefly used for building purposes, and the larger logs sawn up into planking by the saw mills; besides which there are several wood-grinding mills in the Harz, which grind the spruce wood into pulp for paper manufacture, and one mill I visited in which the sawdust from the saw mills was ground down further into wood flour, or dust, for paper manufacture. Spruce on the mountains.
Use of the spruce wood.

At the latter establishment sawdust from the saw mills was purchased at the rate of 4½d. the cwt., and it was sold afterwards according to quality.

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per cwt. do. do.

It is packed in bales, containing about 2 cwt., and measuring 18 cubic feet, or in bags of 1 cwt.

In India, where there is a large consumption of paper, and thousands of square miles are covered with forest trees, producing soft white woods, a similar application of it might be advisable.

Natural reproduction in the spruce forests on the Harz is seldom attempted, as being too slow and uncertain, but if there are large clumps of naturally-sown spruce, they are sometimes kept up. Natural reproduction of spruce.

Almost all spruce forests are regulated high forests, with complete clearings, either re-sown, which is still preferred by some, or planted, which is by far the most general mode of establishing or re-establishing spruce forests. If sown, lines about two feet in width are prepared by clearing the weeds, &c., off the ground, and placing this at the edge of the lines to prevent the wind blowing away the seed, or rain washing them off. Raising spruce forests by sowing and planting.

The soil on these strips is sometimes loosened or left as it is if the seed is to be sown broad-cast. If the seed is sown in rows, small furrows are made. Between the cleared strips, the ground to double this width remains untouched.

On the hills these strips are always run horizontally along the hill side. In other cases, only small patches are prepared for sowing, and this is the practice in high and much exposed localities.

For plantations, the seed is sown in seed beds (*Samenkampe*), which are good, even, and sheltered pieces of land, about half an acre in size, and well dug up, afterwards levelled, and occasionally also slightly manured by ashes of the weeds, remains of wood, &c., collected on the surface, brought together, burned, and afterwards mixed with the soil.

These seed beds are usually in the immediate neighbourhood of the ground to be planted, and have to be fenced in.

If the seedlings, after they are three or four years old, are to be removed from here at once to the spot where they are to remain, the seed beds have to be larger, especially if the young plants are to be planted out in numbers, *i.e.*, three or four plants in one hole. In the latter case the seed is sown generally in furrows, one foot apart, as being more convenient, and requiring here in the hills about 75 pounds of seed for half an acre, which is sufficient to plant 50 acres of forest.

The better plan, however, is to have the plants from seed beds, after they are two years old, transplanted singly into a nursery at about seven inches distance, where they remain until they are four or five years old; this, however, requires at least as much space again for the nursery as the seed camp.

Not unfrequently four to six years old seedlings are taken from adjoining forests, where they are generally so close as to permit of the removal of many of them, and this is the most inexpensive way of procuring seedlings in limited numbers.

Where there is a great demand for the thinnings of young spruce forests, as well as in high and exposed localities, the planting of three or four seedlings in one hole recommends itself.