

A regular network of ditches, distributed over the ground after a well-considered plan, as well as the spreading of the soil taken out of the ditches over the surface of the beds between, are the ordinary means of rendering such localities fit for cultivation.

Previous turning over of the soil is here, as everywhere, followed by superior growth, justifying it whenever the funds are available.

Spruce in exceptionally wet places were even planted on the top of the soil, and their roots surrounded with earth, which answers admirably.

Moorpan in wet localities is not found quite so troublesome as in dry, but repays here also the expense and labour of breaking through it.

The general appearance of young Scotch fir on these beds between the trenches was very promising, whilst the same tree on simply harrowed ground looked very healthy but without the same vigour, showing that by the digging of the soil the plants gain several years.

At the Saupark forests, on the Deister Hills, I received instruction in the cultivation and treatment of beech forests, which studies I continued also on the Solling Hills. Both localities are south of Hanover, and contain some of the richest forests in the province.

The beech is very extensively grown in Germany, on account of the great value of its wood as fuel, for which it is chiefly used.

As timber it has been found to answer for ship-building, railway sleepers, the manufacture of furniture, cartwright work, and many other minor purposes.

No tree is more adapted for keeping up the quality of good forest land and for improving inferior soil than the beech, and it is cultivated wherever the soil and climate permit. It ascends in North Germany to a height of about 2,000 feet, above which elevation its cultivation ceases to be remunerative. Lime and red sandstone hills like these are best suited for the beech, and allow it to attain great perfection.

Seed beds for beech are prepared in the ordinary way, and the seed is sown in autumn as well as in spring. If the former time is preferred, care has to be taken that the seed does not germinate too early, so as to be exposed to spring frosts: this is prevented by covering over the beds after the surface gets slightly frozen, and by removing the covering in spring so late that the young seedlings have nothing more to fear from the frost. If sown in spring, the seed has to be carefully stored during the winter. Steaming, as well as excessive drying, must be guarded against; the first is avoided by turning over the seed or even keeping it spread out; the second by slightly watering it and turning it over afterwards, so as to distribute the moisture equally. A cool, moist room on the ground floor is preferable to a warm and dry one.

From the seed beds the plants are either removed at once into the forest or into other nurseries for transplanting and keeping until they reach a height of 3 to 4 feet. If they are to be planted in open ground, without the protection of old trees, they are sometimes kept in the nursery until they reach a height of 10 to 12 feet, which however is a very expensive measure, and only adopted in exceptional cases. In this case care is taken that the young shoots are not removed from the stem, as the bark of the beech is very easily burnt by the sun, and otherwise apt to be damaged by the weather.

Unnecessary exposure of the roots of the young beech is carefully avoided, as they are very sensitive, and demand special care during the removal of the plants. Where it can be done, some of the soil is left on the roots for the same reason.

Ordinarily the beech forests here get re-established by natural reproduction, *i.e.*, the shedding of seed from old trees. Where the beech occurs mixed with other kinds, as in the coppice with standards, its regeneration is furthered or checked according to circumstances, but planting is seldom resorted to.

In the pure, high forests of beech the natural reproduction is brought about by gradual and well-considered fellings, which tend to effect this as completely as possible. In hilly or mountainous localities fellings are commenced at the top of the hill. These fellings take place when the trees have reached maturity, and are three to four in number, and distinguished according to the immediate effect they are intended to have on the forest.

The first felling, called in Germany the preparatory cutting (*vorbereitungs hieb*), is intended to facilitate the decomposition of the dry leaves and branches which cover the surface, and thus prepare it for the reception of the seed, which latter, without this precaution, frequently germinates without being able to penetrate with its roots the comparatively hard and leathery leaves lying on the surface, and often dies in consequence, whilst weeds and scrub easily get up in it, and cover the surface soon, thus adding to the difficulties to be overcome by the young plants. It is commenced several years before the intended regeneration, and carried out gradually; but where the air and light thus admitted are not sufficient to render the surface fit for the reception of the seed, a timely permission to villagers to remove some of the dead leaves is resorted to. Besides the preparing of the soil, this opening out of the forest induces the tree to flower and bear seed more frequently than when standing very close.

The second felling, the so-called seed cutting (*samenschlag*), is carried out as soon as the bearing of seed becomes probable, which can be judged of beforehand by the appearance and the shape of the buds during the preceding winter. An abundant seed-bearing season generally occurs with the beech after longer or shorter intervals, but sufficient seed for the regeneration of the forest may be reckoned on every second or third year. Precaution is used not to remove too many trees at once, as in case of the flowers being destroyed by spring frosts or from other causes, the re-stocking of the ground with young plants does not succeed. Too much light would dry up the surface of the soil, and induce the weeds to overrun the ground, both circumstances seriously interfering with the germination of the seed at a future season. Where at this time the suitability of the soil or a portion of it remains doubtful, a timely loosening and preparing of it in strips or patches is resorted to to insure success.

Where the expected seeding of the trees turns out a failure, further clearing is carefully avoided, to prevent the deterioration of the soil or overgrowing with weeds. If, however, the season is a favourable one, and produces sufficient seed, and the young plants germinate, this felling is soon extended to a greater number of trees, to admit more light and dew to strengthen the young plants.

For the purpose of getting the seed worked into the ground, herds of swine, cattle, &c., are often driven through the forest with good results.

Deister and
Solling Hill
beech forests.

Use of the beech-
wood.

Improvement of
the soil by the
beech.

Raising beech
forests by sowing
and planting.

Natural repro-
duction in beech
forests.

The preparatory
cutting.

The seed cutting.