Aspects of Tree Nutrition on Peat

The relationship was discussed between the mineral nutrition and growth of Sitka Spruce planted on deep oligotrophic blanket peat in Northern Ireland. Oligotrophic peat was defined as that group of peats supporting vegetation the main species of which are *Calluna*, *Erica tetralix*, *Trichophorum caespitosum*, *Narthecium ossifragum* and *Sphagnum ssp*. This type comprises some 48 per cent of the total area of peat in forests in the North. Peat of all types represents almost 50 per cent of the present forest area. A recent inventory survey has shown that the present average growth rate of Sitka on oligotrophic peat corresponds to only Yield Class 9 (metric).

One way of increasing this rather meagre production is by fertilizer application. With the old treatment of applying a handful of basic slag in the planting hole, growth, although promising for a few years, soon slowed down until the extensive areas planted in this way were well and truly in 'check'. Application of rock phosphate at rates of 500-1000 Kg/ha greatly increased growth and for a year or two this seemed to be a solution to the problem. However although this treatment increased growth and both phosphorus and nitrogen uptake by the trees, growth was limited about six years later by nitrogen deficiency. Treatment of the often vigorous Calluna with either paraquat or 2,4-D substantially increased nitrogen uptake and growth but without further fertilizing growth returned to its pre-treatment level after only three growing seasons. Where both herbicide and fertilizers were applied growth increased for five years after treatment before decreasing to the pre-treatment rate in a further two years. In both cases growth was again eventually limited by nitrogen deficiency.

Even where high rates of phosphate were applied at time of planting nitrogen deficiency started to limit growth seven years later, despite the fact that phosphorus and potassium levels in peat and trees were still high. Growth could be increased only by the addition of fertilizer nitrogen. However, within three years of applying urea at 250 kg/ha nitrogen uptake by the trees was

^{1.} By D. A. Dickson, Agricultural and Food Chemistry Research Division, Ministrv of Agriculture, Belfast. Paper delivered to Society of Irish Foresters Annual General Meeting, Dublin, 10th March 1973. Full text will be published in Forestry.

Irish Forestry

again critical and growth rate decreased. At ten years of age plantations (especially in the west) grew at a rate corresponding to Yield Class 24 (metric). However, all present evidence suggests that satisfactory growth beyond this age can be maintained only by the rather frequent addition of fertilizer nitrogen.

Limestone at up to 22 t/ha at time of planting reduced growth over the following six years. Soil pH was increased to over 6.5 and faunal activity greatly enhanced but the uptake of nitrogen, phosphorus and potassium all decreased. Trees planted seven years after liming at lower rates, however, grew remarkably well once the lime-induced potassium deficiency was overcome. Nitrogen availability was greater than in unlimed peat.

Unless a treatment such as liming can increase the availability of the nitrogen in peat over an extended period it seems that it will be necessary to apply fertilizer nitrogen regularly if the growth of Sitka Spruce on oligotrophic peat is to be maintained at a reasonable level. This will be an expensive operation.