A note on Peat Afforestation with special reference to work carried out in Cloosh Valley, Connemara.

By T. Ó Gruinéil

THE extent of blanket bog in Ireland makes the successful utilization of some of it for forestry purposes work of considerable national importance. Indeed the establishment of an economic tree crop on these areas is a challenge to the skill of the modern forester. The difficulties with which he is faced are great but it is only the defeatist who will say that they are insuperable. After all there is proof in these bogs that high forest of pine, oak, birch, etc. once grew on peats similar in composition to those with which we are dealing to-day. Even allowing that those primeval forests were different in some respects from those of our own time it can be concluded from a study of the tree stumps that can be found deep down in the peat that the climatic conditions under which they grew were much akin to those obtaining at present. Coming to more recent times we can find, in seclusion here and there, a flourishing tree crop won from the most acid peat. These crops are the achievements of private owners who did not jib at expensive site preparation so long as it made possible the production of a tree crop. Of course it may not be economically sound to adopt on a large scale the methods of establishment which were employed in respect of these comparatively small areas, but nevertheless the proof is there that these peats will yield trees.

At present we have our own State forests on those forbidding peats some of them now six years old and making great progress. Promising though these plantations may be, however, the writer is of the opinion that in the matter of *site preparation* the surface has merely been scratched. For the *Molinia* clad flush or the *Scabius* clad mineral peat

the heavy mounding plough we know suffices; but for the dwarf, diffuse *Molinia-Eriophorum, Calluna-Scirpus, Narthecium-Erica tetralix* types much more is required than ribbon-ploughing and manuring. A great deal more disturbance of the peat in order to aerate and oxidize it and to release its locked up nutrients is required, and drainage to much greater depths than we have been accustomed to, would follow.

Unless peat is disturbed and aerated it is highly repugnant to tree growth; all the writer's observations to date show that these young plantations are virtually living on the inverted ribbon having made no effort to explore the underlying peat. Inevitably if the food supply in the ribbon cannot be supplemented as the tree requires it, "check" will set in.

The writer's prescription for those difficult types would be firstly a thorough processing or maceration followed by mounding/draining to a depth of from 36 inches to 48 inches at 10 foot spacings plus manuring as now practised with, maybe a slight emphasis on the application to sitka spruce. This preparation should be economically feasible even if it doubled the present low costs of establishment on such types where machinery can be freely used. Rotovation should not cost more than double the present mounding figure and mounding/draining at 36 inches to 48 inches is well within the capacity of available equipment at slightly increased cost. The preparatory work suggested should not cost more than £15 per acre. This preparation would have the added advantage that a high proportion of spruce could be used with confidence, enhancing the value of the crop to a degree more than commensurate with the initial extra cost involved. Also, it would mean more speedy closing of canopy and suppression of the vegetation, a higher yield, and a much more stable peat to give safe anchorage to the crop.

A word or two about our work here in the Cloosh Valley in Connemara might not be amiss.

Planting is done by a wedge-shaped dibble $3\frac{1}{2}$ inches wide and 15 inches long. This has given great results: it is very tidy to carry about, opens a slit that always has a tendency to close thus eliminating airpockets and reducing damage by desiccating March winds and scorching summer sun. Planting costs have been very low here mainly on account of this dibble.

In recent years the selection has been 50% *Pinus contorta*, $37\frac{1}{2}$% sitka spruce in mixture with $12\frac{1}{2}$% birch, the last mentioned in belts 4 to 5 lines wide at 100 yard intervals and at right angles to the prevailing wind or occasionally in groups of 10 plants 45 feet apart. In very distinct *Molina-Juncus* flushes sitka spruce is planted pure. That there will be some criticism of this selection cannot be gainsaid but it is hoped to have a good proportion of sitka spruce in the final crop with *Pinus contorta* thrown in for physical effect and birch for building up soil

fertility. In respect of the last mentioned species group planting is desirable in order to ensure an even distribution of the leaf fall but against that planting in lines, while satisfying reasonably well the distribution problem, might also form a firebreak and later on a windbreak for the pines and spruce. Many contend that the pine will outpace the spruce but the performance to date shows the latter well up with the leaders. The spruces should also have a physical effect on the pines, keeping them straight and wind firm. Better preparation as already outlined, increased drainage and more judicious use of manures would help matters a great deal. The writer is of the opinion that spruce is the tree to be fostered in peat afforestation for the following reasons. It has the anchorage best suited to peat inasmuch as that it has characteristically a lateral root system, it is the most valuable and versatile final crop and, growing on peat, it has been observed to be remarkably free from butt rot. At Ballinahinch forest some giant sitka spruce which grew on peat showed not a trace of butt rot when felled even though some of the early annual rings were as much as one inch wide and as such presumably more susceptible to decay.

One of the big problems outside of drainage in growing it here is its susceptibility to check on *Calluna* ground. This heather ground is potential spruce ground being on par with *Molinia* ground. If such ground lent itself to rotavation with a resultant killing or severe checking of the heather there is no doubt that with generous manuring it would grow spruce well. There are various reasons advanced for spruce going into check on heather ground—the toxic effect of heather roots, competition for nitrogen. An angle worth investigation is the high lime content of heather—a phenomenon that runs counter to expectation. Peat of this composition would be intractable to our calcifuge spruce. Whatever the reason may be we should not tire of trying to find ways and means to grow a great tree better.

Pine, which must be our number one reclamation species on peat, even though essentially a tap rooter and a tree of rocky terrain can adapt itself to peat soils as is clearly evident from the high percentage of pine stumps in our bogs where one can find examples of a great development of the lateral roots with little development of the tap root. There is evidence of the same tendency in young *Pinus contorta* on peat to-day. That straight, clean stems of this species can be expected from any percentage left for the final crop is reasonable in view of its performance in some well treated stands in this country. It is expected that it will have a "drawing" effect on the spruce should the latter need such.

The age of plants used here seems to suggest that 1 + 1 *Pinus contorta* and 2 + 1 sitka spruce are best. A high percentage of seedling *Pinus contorta* was used in the 1952 planting here with a resultant very high percentage failure. Those that survived never got going vigorously but always remained spindly and sickly green while 1 + 1 plants

from the same lot of seedlings planted out one year later are at least twice as big and show great vigour.

Drainage experiments carried out here recently suggest that it is a very important factor as the following figures show:

Average 1956 leader growth in P/52 *Pinus contorta* in compartment 10 Cloosh Valley.

Mound-planted and manured	6.3 "
Ditto with mound drains deepened 18 inches in winter of '55	9.25"
Ditto with every second mound drain deepened 18 inches in winter of '55	7.7 "
Ditto with mound drains deepened 36 inches in winter of '55	11.5 "
Ditto with every second mound drain deepened 36 inches in winter of '55	8.9 "

Similar experiments carried out in sitka spruce show the same trend. From these trials we see that the more intensive and the deeper the drains the greater the increase in leader growth. There is also a marked increase in needle growth but the striking feature of the crop is its great vigour and the dark green colour of the foliage, the green becoming deeper as drainage is intensified. Normally such a response is not expected in so short a time—a clear indication that it is very necessary. It will be interesting to see how those plots behave in later years.

Manurial experiments carried out here seem to follow the path of similar ones carried out by the British Forestry Commission. Untreated control plots in earlier plantings have either stagnated or succumbed. The normal dressing at present is: 3 ozs. ground mineral phosphate per plant for sitka spruce and birch, and 1 oz. per plant for *Pinus contorta.* At first basic slag was used. To this the plants responded somewhat quicker but they did not seem to retain their vigour as well as those dressed with G.M.P. While it seems that phosphates will be the mainstay of our manurial treatment for the future one would like to see more exhaustive trials of the trace elements, notably copper which is proving of great significance in agriculture elsewhere on acid types. The time of application of the phosphate is very important: the earlier it is applied, the better the plant while in the case of sitka spruce if it is delayed the tree, although it may grow, *never* catches up on its comrades manured earlier. Any delay in manuring is time lost and must reflect unfavourably on the yield in the final crop.

To finish, if the writer may, in the light of his present knowledge, offer a brief prescription for the establishment of a tree crop on Connemara peat it is as follows:

(1) Drain intensively and have ground prepared at least 6 months and preferably one year in advance to allow washing out of harmful

acids and decomposition of the peat leaving it less liable to open in summer heat.

(2) Plant ages : 1 + 1 pines, 2 + 1 spruces, 1 + 1 broad leaved species.

(3) Apply manure immediately after planting.