A NATURALLY REGENERATED MIXTURE IN
DUSKY FOREST

The clearfelling eighteen years ago of 3.5 acres of *Pinus pinaster*
in Dusky Forest Otago, left an area ideally situated to receive natur-ally dispersed seed from nearby stands. This has now developed into
da dense uneven-aged mixture covering the entire area in which at
least ten species are represented.

The total stocking is at present about 5,000 per acre, of which
450 trees per acre exceed fifteen feet in height. This dominant tier
is found to consist of European larch, Douglas fir, oak, macrocarpa,
silver birch, Corsican pine, ash, sycamore, Norway spruce and rowan
in order of frequency. Details of composition of the crop and dimen-sions of the species are summarised (see attached table).

The area was first established in *Pinus pinaster*, pit-planted in
1901 at 4 ft. x 4 ft. spacing. Although pruned in 1929 it soon became
apparent that the crop was worthless and it was cut down in Sep-tember, 1935. Two months later the area was cleared and burned
over, and 10lbs. of *Cupressus macrocarpa* seed broadcast. This was
the only attempt made at artificial regeneration. A good crop of
mixed seedlings had been obtained by 1937, and seeding has since
continued annually in varying degree. It is worth noting that none
of the original crop appears to have survived, nor is there any record
of the survival or regeneration of *P. pinaster* in the early development
of the present crop.

The dense appearance of the stand is deceptive in that the modest
stocking of larger trees (450 per acre) is liable to be overlooked. These
are, just entering the thicket stage and on closing canopy will impose
increasingly shady conditions on the younger and smaller material.
The larger larch, Douglas fir, and silver birch show development
comparable with the best local stands; foliage is strongly coloured
and crowns deep and symmetrical. Oak is straight and well crowned
but falls behind the previous species in height growth. Macrocarpa
is similar, but very widely branched.

The younger material contains examples of early suppression,
particularly amongst larch and birch. Oak and Douglas fir appear
tolerant of the shadier conditions, the former tending towards bushy
habit and the latter grouped in dense clusters which show promise of
entering the upper levels within the next few years. Corsican pine is
small and elongated, but appears healthy and in places has penetrated
the surrounding material. The presence of this species in the mixture
appears to be the result of good seed dispersal about five years ago,
with subsequent establishment in well-lit spots. Ash, sycamore and
rowan are confined to the roadsides at the edges of the stand; only
a few occur in the interior where they appear doomed to suppression.

Shrub species are vigorous. Broom in particular has formed
pure thickets up to 20 ft. in diameter, shading out everything else in

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the process. Manuka borders small open areas in the interior of the stand, and wild rose and several species of *Coprosma* are scattered throughout.

At ground level there is a moderate amount of seedling Douglas fir with occasional patches of larch up to 2 ft. high which appear dense and extensive enough to maintain existence for some time to come. Pasture grasses and common associates are found consistently throughout.

This stand is situated in a sheltered valley of the Pomahaka River at an altitude of 500 feet. The soil is deep and in all respects the site quality is higher than average for the forest, but nevertheless its vigour and density are remarkable. The following stands border the area:—

North: Corsican pine with a small proportion of oak, planted 1907.

West and Southwest: European larch and Douglas fir in mixture, planted 1902.

South: European larch planted 1902.

East: Corsican pine with sycamore, oak, macrocarpa in mixture, planted in 1915.

The prevailing wind is from the south-west.

The immediate future of the stand will probably be marked by the formation of a dominant tier of larch and Douglas fir which is already predictable in proportions of 70% and 30% respectively. Closure of this canopy should tend to inhibit larch in favour of Douglas fir at the lower levels. Evidence exists in surrounding stands that oak is capable of withstanding such shaded conditions as may develop, and, though lagging in height growth, it should survive with macrocarpa to form a small proportion of the final crop. Birch is sufficiently far in advance of other species to remain a feature of the stand for some time to come. The future of Corsican pine is doubtful, as it is small and has already been constricted in competition. Ash and sycamore should survive on the edges, first as thickets and later attaining tree form, while the few spruce in the stand may be expected to behave in a manner similar to Douglas fir at first. Shrubs should largely be suppressed.

A permanent study plot has been sited to include examples of typical silvicultural relationships within the stand. Its present contents have been recorded and charted to scale, with the object of tracing the evolution of the final crop.

J. T. MILLER

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# TABLE.

**Composition of Naturally Regenerated Mixture in Dusky Forest.**

<table>
<thead>
<tr>
<th>Species</th>
<th>Av. No. per acre</th>
<th>Percentage Composition of Crop.</th>
<th>Total crop%</th>
<th>Dimensions.</th>
<th>Approximate Age Range (Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Older regeneration (over 15 ft. high)%</td>
<td>Younger regeneration (15 ft. &amp; under)%</td>
<td></td>
<td>H.t. (Ft.)</td>
</tr>
<tr>
<td>Larch</td>
<td>2283</td>
<td>55</td>
<td>45</td>
<td>45</td>
<td>35</td>
</tr>
<tr>
<td>Douglas fir</td>
<td>1753</td>
<td>25</td>
<td>35</td>
<td>34.5</td>
<td>38</td>
</tr>
<tr>
<td>Oak</td>
<td>527</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>26</td>
</tr>
<tr>
<td>Macaropera</td>
<td>93</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>29</td>
</tr>
<tr>
<td>Silver birch</td>
<td>130</td>
<td></td>
<td></td>
<td></td>
<td>37</td>
</tr>
<tr>
<td>Corsican pine</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>Ash</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>Sycamore</td>
<td>297</td>
<td>7</td>
<td>9</td>
<td>8.5</td>
<td>16</td>
</tr>
<tr>
<td>Norway spruce</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>Rowan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Seedlings to 4 ft.</td>
</tr>
<tr>
<td>TOTAL</td>
<td>5083</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>