HYBRID SOUTHERN BEECHES

By A. L. POOLE

"Although, so far, no artificial hybrids between any of the beeches have been made, there can be no doubt as to their occurrence in nature in great numbers and of many forms." Since Cockayne wrote this in 1926 in his "Monograph on the New Zealand Beech Forests" New Zealand botanists and foresters have accepted, from field evidence, the occurrence of natural hybrids. Although such acceptance, without the support of experimental evidence, has been questioned by some overseas botanists, there can be little room for doubt when one examines a so-called hybrid swarm in the field. But, as when Cockayne wrote, no experimental evidence has been forthcoming.

This note is a preliminary record, firstly of an artificial hybrid, *Nothofagus solandri* x *N. fusca*, made in 1949; and secondly of seedling populations grown from the seed of what were apparently two *N. cliffortioides* x *N. fusca* hybrid trees in Round Bush, Karioi State Forest. This seed was kindly collected by Assistant Forester J. L. Ormerod.

N. solandri x N. fusca Artificial Hybrid (Fig. 1)

The mechanism of making artificial crosses in *Nothofagus* is simple, for male and female unisexual flowers are borne on the same shoot; the male flowers can be removed before they begin to shed pollen, and the shoots, then carrying female flowers only, can be bagged and pollen from the chosen male parent introduced when the flowers are receptive.

Crosses were made in the flowering season of 1948; but it was a poor flowering year, and, as later discovered, little seed normally sets in these poor years. Opossums also showed a distinct prediliction for bagged shoots, but even on those they left alone no seed set. In the good flowering year of 1949 a number of crosses were made The nuts were, however, collected green, and from the sowing only one hybrid seedling was produced. This was from a *N. solandri* female flower on a tree in the Hutt Valley fertilized by pollen taken from a *N. fusca* tree growing in the Wellington Botanical Gardens.

At the end of the second season's growth the hybrid was about 12 inches high and from the cotyledon stage onwards has exhibited intermediate leaf characters. Leaves are much more widely spaced along the stem than in *N. solandri* seedlings and are intermediate in size between the seedling leaves of the two parents. They have minute apicules and minutely crenulate margins while the veining is somewhat like that of *N. fusca* seedlings.

Seedling Populations from Probable N. cliffortioides x N. fusca Trees

Kirk, in 1885, described a species *Fagus blairii* (Trans. N.Z. Inst. XVIII) for which he designated no type, but his collection labelled by this name contains specimens collected from Top House (Nelson), Little Grey River (Nelson), the valley of the Dart (Otago) and Waimarino, all places where forests containing *N. cliffortioides* and *N. fusca* occur. A twig of the specimen from the valley of the Dart is shown in Fig. 12. Cockayne later called Kirk's species *Nothofagus blairii*, but finally relegated it to hybrid origin. Kirk's collection certainly contains specimens with widely differing leaf types, and specimens in herbaria throughout New Zealand are markedly variable in leaf form.

Leaves of Kirk's specimen from the valley of the Dart are 2/3 to 3/4 inch long by 1/3 to 1/2 inch wide, entire, apiculate, and are clothed beneath with appressed tomentum. Trees with somewhat this type of leaf are to be found scattered throughout mixed *N. fusca-N. cliffortioides* forests. Field observations indicate that these might be F_1 hybrids, for, when regeneration comes back on to areas where the forest has been over-cut or otherwise destroyed, the proportion of trees with this type of leaf is high, and there are also to be found trees with a number of other leaf types ranging from the *N. blairii* type to both the species.

Seed was collected from two trees with leaves of the *N. blairii* type in the 1949 seed year in Round Bush of the Karioi State Forest. This bush, which contains a mixture of *N. fusca* and *N. cliffortioides*, has been burned back several chains from a natural edge abutting on to tussock grassland, and regeneration on the burn forms a population that botanists would call a hybrid swarm. This regeneration is now large enough to bear plentiful seed and it was from amongst this regeneration that the two trees were selected.

Seedlings grown from the collected seed showed segregation to types approaching the two species making up the forest and to other types of the hybrid swarm, but they contained none of the parental type. Leaves of the parents and of some of the segregants are shown in the accompanying figures.

This is not conclusive evidence that the parents were fertile hybrids between *N. fusca* and *N. cliffortioides* because the seed was the result of open pollination. The parents could therefore have belonged to a true species that hybridized very freely with the other two species present. This however is most unlikely, since, first of all, hybridization was so complete that no seedlings having the leaf form of the parents were produced—within the limits of this admittedly not very extensive trial—and secondly a species hybridizing as freely as this would have the greatest difficulty in maintaining itself.

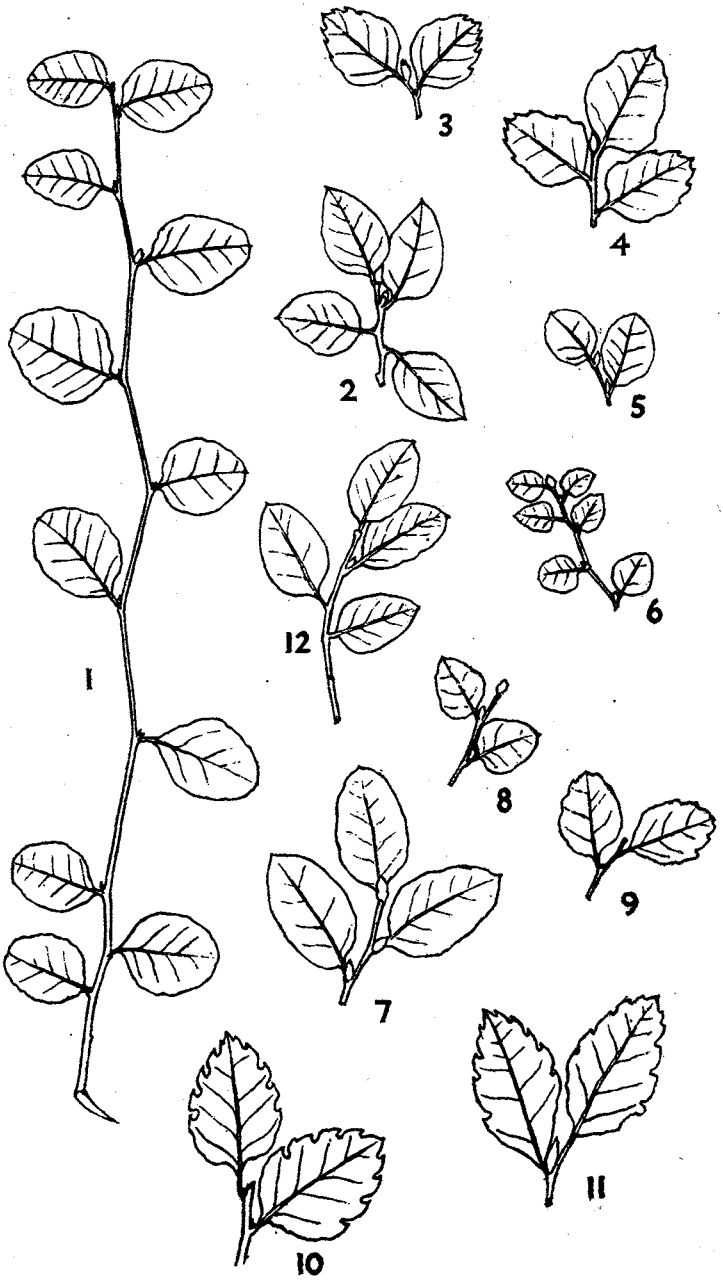
Seedlings from tree No. 1 (Fig. 2) have leaves ranging from the entire leaves of *N. cliffortioides* to leaves with varying degrees of toothing (Figs. 3-6). Some have blunt teeth while others have saw-like teeth similar to those of *N. fusca*; in some leaves the teeth are only near the apex; all leaves, both entire and toothed, have broad bases after the style of *N. cliffortioides* leaves.

Seedlings from tree No. 2 (Fig. 7) have leaves ranging from entire to toothed ones that could be matched in any population of pure *N. fusca* (Figs. 8-11); other types of toothing are also present. The entire-leaved seedlings have prominent veins like those of *N. fusca.*

Acknowledgment—Thanks are due to Miss D. B. Doran for drawing the accompanying plate.

Illustrations

Fig. 1 : artificial hybrid *Nothofagus solandri* x *N. fusca* (seedling leaves). Figs. 2 and 7 : parent trees from Round Bush, Karioi. Figs. 3-6 : leaves of seedlings from 2. Figs. 8-11 : leaves of seedlings from 7. Fig. 12 : *N. blairii* in Kirk's collection from the valley of the Dart. (All natural size).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