

Provenance variation in cabbage trees: northern South Island

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Introduction

I have found that it is extremely difficult to build up a picture of variation in cabbage trees unless observations are made over long distances in one time period. Nuances are lost and a photographic record is seldom definitive. Cabbage tree variation can be considerable in one area, and there can be broad transition zones between different forms. Observations by car are extremely valuable. Although there is always the possibility that key populations are missed, for the most part roads traverse the country that cabbage trees like, and the passage in and out of towns offers insight into human influences.

On 10 October 1993 I travelled from Blenheim to Christchurch via Greymouth and Arthurs Pass. Then on 12 October I completed the round trip to Blenheim via Kaikoura. I noted the distribution, ecology, condition, human association and provenance variation, of cabbage trees along this route. Provenance variation is considered to be expressed in leaf colour, shape and size, and plant habit, particularly canopy shape.

Observations

1. WAIRAU RIVER VALLEY

Cabbage trees occur throughout the valley from the coast to near Top House Saddle (0-600 m). They are generally uncommon, especially on the alluvial flats, but there are several small stands of 20-50+ trees associated with remnant flax swamps and riparian zones along the lower reaches of contributing streams. In the upper portion of the valley, on wetter soils, cabbage trees are commonly scattered over the lower northbank gullies, but they are not present on the Red Hills ultramafic slopes. Some of the stands deserve protection through fencing, and one area, at Saltwater Creek and Cabbage Tree Gully, is worthy of a detailed conservation investigation. One of the swamps occupies the fault-angle depression of the Alpine Fault, New Zealand's fundamental structural feature.

Two provenances are encountered. In the lower half of the valley the cabbage trees are green, narrow-canopied and the leaves are relatively narrow and lax. This form is similar to that common in lower, western North Island, but is a smaller tree, with smaller leaves. The dead leaves tend to remain attached to the leaf-head creating a green-brown mosaic across the canopy, and this contributes to an overall "untidy" appearance of Wairau cabbage trees.

The upper valley supports a different provenance. It is generally a larger tree with a spreading canopy and the leaves are blue-green, broader than the green provenance and tend to be somewhat stiffer although they are lax in most individuals.

The two provenances overlap, and a stand at Centre Valley Stream possesses both types, along with intermediates.

2. BULLER RIVER AND GREY RIVER VALLEYS

Apart from planted trees, there are no cabbage trees between Top House saddle and Totara Flat inland from Greymouth. This is surprising because the land is well within the altitudinal range of cabbage trees. All the trees were obviously planted; some belonged to the blue-green (glaucous) provenance, some to the green lax provenance, and one resembled neither. There is a large population of ti ngahere (*C. banksii*) south-west of Murchison, which seems to confirm the largely different ecosystems favoured by *C. banksii* and *C. australis*, namely wet, hill country by the former, lowland floodplains by the latter. However cabbage trees are absent from manuka or matagouri covered river flats along the Buller River.

3. WEST COAST

Naturally occurring cabbage trees are seen again at the upper end of Totara Flat, above the Ahaura River. They are exclusively blue-green. They are infrequent south to Greymouth and seem to avoid the podocarp dominated pakihi wetlands. There is an occasional suggestion of the Wairau provenance in the greenness and small size of the leaves and sometimes the leaves assume a stiff, erect or patent aspect, but overall the population from Totara Flat to the Taramakau River is exclusively the robust blue-green provenance. Cabbage trees are very common in wetlands among the coastal sands and gravels.

Cabbage trees along the Taramakau River valley are more variable. At Harris Bridge they have stiff, yellow-green leaves. At the narrower Taramakau gorge they are typically glaucous with large lax leaves, while at Jacksons there is a small group of green, columnar trees typical of the Wairau type.

4. CANTERBURY

Cabbage trees are not observed across the main divide until the foothills near Springfield on the eastern side of Porters Pass. Here, cabbage trees are numerous on the lower hill slopes, and are exclusively of the green, conical, lax-leaved provenance. They are very rare across the Canterbury plain, but are common in gardens. Throughout Christchurch cabbage trees are numerous. The only natural one seen was at Burnside High School, a Maori landmark tree locating the boundary between the food-gathering areas of two hapu. All the trees seen in Christchurch belong to the green provenance.

Cabbage trees are very infrequent on the North Canterbury plains, but become increasingly common in the hills (slopes, gully-sides and riparian zones) of the Waipara Ecological District. They are scattered throughout the hill country to Kaikoura, and along the coast of Marlborough. No particularly large stands were seen.

5. KAIKOURA

The outwash fan north of Kaikoura supports a few very large cabbage trees. These are typical of the Canterbury-lowland Marlborough form but are exceptionally vigorous because of their location. One tree possessed 20 trunks surrounding a central space that was probably the position of the original trunk. The largest cabbage trees are seen on flood plains and outwash fans with plentiful ground water. Notably large specimens were also seen at the mouth of the Wye River (Wairau), the floodplain of the Grey River immediately inland from Greymouth, and the mouth of the Clarence. It is important not to confuse genetic and environmentally related characteristics.

Discussion

1. ECOLOGY

Cabbage trees extend inland along valleys, but are more closely allied to coastal influences than altitude. They are predominantly riparian or swamp plants with little colonization of dry alluvium. However, the largest plants occupy floodplains or fans with plentiful ground water. They occupy hill-slopes of several kinds - wet-inland (upper Wairau), dry-inland (Springfield, Waipara), moist coastal (Kaikoura). This pattern may relate to colonization from riparian populations following removal of the forest cover, or may reflect natural spread from hillside flushes or rocky areas which may have been open when the surrounding slopes were forest (or tussock) covered.

2. PROVENANCE VARIATION

Two provenances are encountered:

- (1) "Typical cabbage tree" - green, medium-narrow leaves, lax leaves, usually conical canopy shape. This provenance occurs in Canterbury through to Marlborough (and extends to Nelson and Takaka). The Wairau stands are particularly small-leaved and have a distinctive "untidy" appearance. Somewhat similar but even narrower-leaved cabbage trees occur along Eastern North Island, where the leaves are either lax (Wairapa) or patent-erect (East Cape). These variations may be considered as sub-provenances.
- (2) West Coast Provenance - this provenance occurs from the lower Grey River south at least to Taramakau (the distribution north and south has not been examined). It also occurs in the Upper Wairau. It has blue green leaves and is generally a more robust, "neater" plant than the "typical cabbage tree", with a rounder, spreading canopy. This form of cabbage tree has not been seen elsewhere in New Zealand.

The two provenances overlap and intermix, especially in the Wairau.

3. HUMAN INFLUENCES

There appear to be two levels of human impact:

- (1) Recent (Pakeha): the distribution of cabbage trees has been extended inland (e.g. to Murchison). Generally speaking the predominant local form is planted in gardens, but sometimes the form appears foreign to the region.
- (2) Old (Maori): the occurrence of "Canterbury-type" cabbage trees at Jacksons at the base of Arthurs Pass may relate to Maori planting. The occurrence of the glaucous West Coast provenance in the upper Wairau might also be of Maori origin because the Buller was a route between the two areas. The inland Canterbury foothills population may have resulted from kauru (hangi cooked stems) plantations. The variable character of some of the coastal West Coast trees could represent intermixing of the two provenances.

Although of uncertain significance, these observations suggest that human impact on the distribution and genetic characters of cabbage trees could be considerable, and is still continuing.

Conclusion

An overview of cabbage trees in terms of ecological preference, provenance variation and human impact can be obtained from long-distance travel by car. My observations on this trip suggest that cabbage trees are fundamentally coastal-lowland wetland plants capable of inhabiting a diverse range of more inland, especially drier, sites. They have genetic variation resulting in regional provenances and sub-provenances. However human induced migration has made the natural pattern difficult to decipher.

Only one plant suggesting Sudden Decline (at Dobson) was seen. Large stands of cabbage trees are rare and the health of many in riparian zones and remnant swamps is declining. There is an urgent need to protect representative sites and landscapes from further disturbance by stock, land clearance and drainage.

It is obvious that there are gaps in cabbage tree distribution, largely because they are fundamentally coastal plants that migrate up the valleys but are seldom present along colder inland valleys such as the upper Buller and Grey. Therefore, if planting cabbage trees for ecosystem restoration purposes, one must limit planting to natural cabbage tree sites.