

(η.) *Pimelea arenaria* (the Sand *Pimelea*; *Aute-taranga*, *Toroheke*).

Found only in New Zealand; common on dunes everywhere, except in Stewart Island, the Kermadec Islands, and the Subantarctic Islands.

*Pimelea arenaria* is a close-growing, much-branched, low shrub, its final branchlets erect and forming close masses.

The *main stems* are cord-like, but not as flexible as in *Coprosma acerosa*, frequently several feet in length, thus having the faculty of lengthening as they are buried. The *shrub* is leafy at the periphery only for a depth of about 2 in. to 4 in. The *prostrate branches* finally give off erect, straight twigs, which branch corymbosely at a narrow angle, thus giving a flattish top to the shrub. The *ultimate* and *subultimate twigs* are alone leafy. The *leaves* are of a broadly ovate type, about  $\frac{3}{4}$  in. long, closely covered beneath with appressed silky hairs, as are also the final twigs. The *buds* fit in with the station, the hairs of the leaf affording special protection. The *flowers* are in close heads at the tips of the branches, and are polygamo-dioecious. The *drupe* is white and fleshy. The *roots* are of great length, and adventitious roots are fairly abundant from the uppermost branches, the rest of the shrub being beneath the sand to a variable depth.

From the preceding description it may be seen that both *P. arenaria* and *Coprosma acerosa* are sand-binders to a limited degree, and can with a slow drift continue to grow upwards and rejuvenate themselves, thanks to the power of putting forth adventitious roots from the subultimate twigs.

(θ.) *Cassinia leptophylla* (the Cottonwood; *Tauhinu*).

Found only in New Zealand in the central floristic province. The two closely related plants, *C. retorta* and *C. fulvida*, are found, the former in the northern and the latter in the southern province, on the dunes. *C. Vauvilliersii* occurs in Stewart Island, but it is not a dune plant, though quite well adapted for such a situation.

*Cassinia leptophylla* may be taken as the type of the dune cassinias. It is a shrub of the ericoid habit, from 3 ft. to 5 ft. tall, or even more.

The *main stems* are few, naked, and not much branched at first, but above they branch abundantly into slender leafy twigs, which finally give off at a narrow angle flexible, straight branchlets, which are covered with a moderately loose cottony greyish tomentum. These final shoots form close masses of leaves, but those of one branch are distinct in themselves, and do not mingle with those of the next. The *leaves* are very small, narrow, linear or linear-spathulate,  $\frac{1}{2}$  in. to  $\frac{1}{4}$  in. long, patent or semi-imbricating, coriaceous and moderately thick, bright shining green on the upper surface but tomentose beneath, the tomentum being slightly tinged with yellow. The *bud-leaves* imbricate; they are resinous, and the tomentum of the leaves also affords protection. The *flower heads* are numerous, white, and in small terminal corymbs 1 in. or more in diameter at the ends of the branches.

*C. retorta* and *C. fulvida* are very similar to the above; the former has white tomentum, and the latter is almost of a golden colour from the tomentum on the under surface of its leaves and final slender branchlets.

It is simply the xerophytic adaptations of the above shrubs which has enabled them to settle upon the dunes, though at the same time the stimulus of the moist sand causes sometimes the putting forth of adventitious roots.

(ι.) *Festuca littoralis* (the Sand *Fescue* Grass).

Found in all parts of the coast of New Zealand, except the Kermadec and Subantarctic Islands; also indigenous in temperate Australia.

*Festuca littoralis* is a "steppe grass," forming close-growing tussocks about 2 ft. tall and 5 in. or so through at the base.

The underground *stems* can lengthen upwards to some degree as buried, new roots arising from near the base of the leaves, and plants may rise in this manner 1 ft. or more, thus withstanding a slow burial. The *leaves* are narrow, strongly involute, green when young or in the shade, but frequently yellowish. The *leaf-sheath* is pale-coloured and thick. The *lamina* is 16 in. long or thereabouts, its upper surface furrowed and waxy. The *roots* are numerous, wiry, brown, furnished with many short filiform rootlets, and frequently spread out laterally for a distance of 3 ft. The *panicle* is dense, spike-like, and the spikelets turgid.

(κ.) *Calamagrostis* (Deyeuxia) *Billardieri*.

Common on New Zealand coast, except in the Kermadec Islands and the Subantarctic Islands; also indigenous in Australia.

*Calamagrostis Billardieri* is a tufted perennial grass forming small green patches about 1 ft. long by 6 in. broad.

The underground *stem* is pale, slender, wiry, creeping, and furnished with a great number of slender roots about 6 in. long. The *leaves* are shorter than the culms, and the blade is bent outwards from the sheath, spreading semi-vertically; it is about  $3\frac{1}{2}$  in. long by  $\frac{3}{10}$  in. broad, bright green, flat, membranous, and tapers to a short point. The *panicle* is 6 in. to 10 in. long, as broad as long when fully expanded; its branches are hair-like, arranged in whorls, and branch trichotomously.

(λ.) *Scirpus nodosus*.

Common in New Zealand, except in the Subantarctic Islands, but not confined to the dunes; also indigenous in temperate Australia, Norfolk Island, South Africa, South America, St. Helena, and Amsterdam Island.