

Juvenile plants, growing in hollows or sand-plains, show little trace of the far-creeping rhizome, whose extreme development depends upon an abundant sand-supply.

(γ.) *Euphorbia glauca* (*the New Zealand Spurge; Waiuatua*).

Found in all parts of New Zealand along the coast, except in the Kermadec and Subantarctic Islands. Also occurs in Norfolk Island.

Euphorbia glauca is a tall herbaceous plant, forming considerable colonies, and capable of much extension through its far-creeping rhizome.

The stout, terete stems stand erect above the sand for 3 ft., more or less, and descend for a variable distance. They are naked for the lower two-thirds, but marked with old leaf-scars; above they are covered closely with leaves. The naked portion of the stem is red or green, the former colour depending on excess of light. The leaves are alternate, of obovate type, but differing in width, 2 in. or 3 in. long, entire, sessile, and fleshy. All the parts are full of milky juice. The roots are long.

(δ.) *Calystegia Soldanella* (*the Shore convolvulus, or Bindweed*).

Found on all parts of the coast-line, except in the Subantarctic Islands; elsewhere it occurs throughout the temperate zones. As well as on the dunes proper, it grows on sandy and even gravelly shores.

There is a long creeping rhizome, very variable in thickness, attaining a maximum of about $\frac{3}{8}$ in. It is terete, brittle, brownish, and much-branching. The stems are prostrate and trailing,* variable in diameter, frequently many feet in length, very flexible and cord-like, and branch abundantly, the final slender branches bearing many leaves. The leaves have long stout petioles 1 in. to 3 in. long, which raise the blades above the sand. The blades are reniform, broader than long, being 1 in. long by 2 in. broad, more or less. They are bright glossy green, thick, fleshy, brittle, and the basal lobes are frequently brought close together, rendering the leaf funnel-shaped. The leaves all touch, and together with the prostrate stems form a close mat (see Photo. No. 27) about 3 in. in depth, which absolutely prevents any sand moving. Such mats are frequently several square yards in area, and small dunes may be quite covered, forming green oases absolutely stable in a moving waste of sand. The flowers are on stalks about equalling the leaves. The corolla is very showy, being 1 in. or more in diameter, and pale lilac in colour, but paler still in throat, with band of this colour down centre of each division of corolla. The roots are numerous, and when given off from the stems help to bind them to the sand; but many of the trailing stems are for the most part without such roots.

(ε.) *Carex pumila* (*the Sand Sedge*).

Found on dunes and sandy shores of the North and South Islands, the Chatham Islands, and Stewart Island. Also indigenous in Australia, temperate South America, and eastern Asia.

Carex pumila is a small sedge, which, like other sand-binding "grasses," can increase enormously by vegetative means. Its low stature and the bending downwards of its leaves does not enable it to withstand the drift of the dune proper, though very useful for wind-resisting, and it is in consequence confined to the sand-plains. It is also possible its water-requirements may be greater than those of the preceding plants.

There is a slender rhizome about $\frac{1}{8}$ in. in diameter, which may extend for many feet, giving off small bunches of four to six fully developed leaves at intervals. The leaves are grass-like, sheathing at the base, the sheaths overlapping. The blade is thick and coriaceous, 1 ft. or more in length, but frequently less, and $\frac{1}{8}$ in. or more in breadth. It tapers gradually to a fine point, is glaucous-green in colour, deeply concave on its upper surface, at first erect and then curving until its apex almost meets the ground. The roots are long and slender. The culms are short, stout, and about 6 in. tall. The utricle is large, turgid, and about $\frac{1}{4}$ in. long.

(ζ.) *Coprosma acerosa*† (*the Sand Coprosma*).

Found only in New Zealand, where it occurs on all dunes, excepting in the Kermadec and Subantarctic Islands.

Coprosma acerosa is a low-growing shrub, which forms flattened cushions (see Photo. No. 28) or thick mats, 2 ft. or so in depth and 1 or 2 yards in length, made up of wiry, interlacing twigs, conspicuous through their orange or reddish colour.

The main stems are extremely flexible and rope-like, $\frac{3}{10}$ in. or more in diameter, prostrate, and covered with thick brown bark. Such are generally buried in the sand, marking a former surface; or, at any rate, they are quite concealed by the interlacing twigs. The stems forming the cushion are very wiry, flexuous, and flexible. The branching is at right angles or thereabouts, and frequently only from the flanks of the stem. The ultimate twigs are almost straight, and from $\frac{1}{2}$ in. to 3 in. or more long. The leaves are in opposite pairs on much reduced branchlets, pressed closely to the stem,‡ an equal amount of naked stem being between them. They are linear, about $\frac{1}{4}$ in. long, thick, coriaceous, pale or yellowish green. The roots are extremely long, but short adventitious roots are frequently given off from the peripheral twigs, the plant in that case being able in some degree to rise above the drifting sand. The flowers are dioecious. The drupe is fleshy, globose, $\frac{1}{4}$ in. long, more or less, translucent, white stained with pale blue.

* Where growing amongst shrubs, &c., the stems not unusually twine, the plant then becoming a liane.

† This is *Coprosma acerosa* A. Cunn., var. *arenaria* T. Kirk. The var. *brunnea* T. Kirk I consider a good species, which would then be called *C. brunnea*, while the var. *arenaria* will be identical with *C. acerosa* A. Cunn., and is so considered in this report.

‡ Where shaded they are much more open.