

floor for the successful establishment of their seedlings; consequently such forests must have open land bordering them into which they can extend, or else depend for their continued occupation of the soil on their ability to compete for the bared ground rendered available for occupation on the death of a parent tree. Of those trees mentioned earlier only the beech seems capable of doing this.

In making tawa the climax forest-tree of the Taranaki back-country I am confirming the work of Cockayne,* who states: "Tawa forest may, I think, be considered the final stage in the series of succession forming taxad forest; that is to say, whenever it occurs one may conclude that forest rich in taxads previously occupied the ground. In support of this view, all degrees of intermediate stages exist between the rimu and tawa forests."

THE ORDER OF DEVELOPMENT OF SECONDARY SCRUB AND SECONDARY FOREST ASSOCIATIONS.

In the initial grassing of the hill country under consideration there is an incessant struggle against secondary-scrub growth—water-fern (*Histiopleris incisa*), bracken-fern (*Pteridium esculentum*), manuka (*Leptospermum scoparium*), wineberry (*Aristotelia serrata*), &c.—which types of vegetation constitute really the first phases in the succession back to forest. Nature all the time is endeavouring to win back the area to forest, and in a district of fairly good soil and heavy rainfall the advantage is all with the secondary growth. In the Taranaki back-country there is no set of grasses at present known that could be used which in themselves would be sufficiently strong and aggressive to annul the great tendency of that country to revert to secondary growth. The all-important factor of stocking must come in to assist the grasses sown.

It is the writer's intention, before actually considering the suitable pasture species and their establishment and management on this country, to set out in a fairly detailed way the type of secondary scrub and secondary forest one meets with, and to show how every type of vegetation that arises is part of nature's plan to afforest once more those denuded hill-slopes. In other words, the succession from the forest-burn back to standing primary forest will be considered step by step. This study is important because if we know the sequence of even's and the consequences of a certain method of treatment, then are we the more able successfully to avoid that which is undesirable and attain that which is desirable. Where the objective is good grassland, nature has to be combated at every turn, and as we consider the types of secondary growth that arise under different farm-management it will be seen that she is by no means a mean adversary. The grassing of forested hill country is a man's job, and too seldom do we realize the grit, perseverance, and foresight displayed by our pioneer settlers who have struggled and won against great odds.

A succession normally begins with a bared surface—termed the "initial surface"—and it presupposes that all or most of the original plant cover has been destroyed. This is so in the case of the settler's forest-burn. The forest is felled in the winter or early spring and left

*L. COCKAYNE, *The Vegetation of New Zealand*, Leipzig, 1921, p. 139.