

the forest-burn three or four years after the forest-fire. It establishes in shade, under strewn branches or around logs, but it can and does also establish in the central portion of the water-fern and hard-fern patches (Fig. 11). By its strong underground rhizome its spread outward is fairly rapid, and so soon as no cattle run on the area the bracken-fern invasion is fairly fast. Sheep will scarcely eat bracken-fern at all, particularly when the frond is expanded, but cattle keep it well eaten down when forced on to it. Hard fern, and water-fern to a lesser extent, are non-shade endurers. Bracken-fern is a very much taller-growing plant than either of its fellows, and by its growth and spread it forms in the course of four or five years so dense a cover over the hard fern and water-fern that these become entirely killed out, leaving the bracken-fern in sole command of the situation (Fig. 12). The bracken-fern association may therefore be looked upon as another phase or step of the succession back to forest.

If the burn has been of a very intense nature, so that all forest-tree seeds have been killed out, this bracken-fern phase in the succession may last for hundreds of years. In the Taranaki back-country, however, burns are seldom so intensely hot that this happens. In this country, in the gullies and better soils, the next step in the succession begins after four or five or more years. Wineberry, lacebark, fuchsia, and tutu make their appearance—wineberry in particular (Fig. 13)—and now begins the replacement of the bracken-fern and the commencement of the secondary-forest cover, the processes and future development of which are almost identical with that which arises from the initial wineberry association already dealt with.

The bracken-fern phase does not necessarily follow on the hard-fern phase. It may take place in four or five years after the burn, particularly if very little stocking has been carried on. On the country too poor for wineberry and its associates bracken-fern may form the first step in the succession back to forest. Whether, however, the steeper fern-slopes have been derived from the initial burn or after the hard-fern phase their replacement in the Taranaki back-country by secondary forest is much the same. On this higher and drier fern country wineberry scarcely takes any part in the replacement. Tutu is perhaps the prime successional species, but bush-lawyer (*Rubus australis*) also comes in, and in the barer places appear koromiko (*Veronica salicifolia*), manuka, and karamu. The replacement is slow, and it may be twenty or thirty years or longer before there is much appearance of these shrubs among the bracken. In certain slightly richer soils the replacement is, however, more rapid, and once begun other trees come in. Lancewood, fivefinger, kohuhu, tarata, mahoe, kamahi, rangiora, putaputaweta (*Carpodetua serratus*), and hangehange are among the chief (Fig. 14). We thus get in forty or fifty years' time a secondary forest of a somewhat different type from that of the rather better and damper soils of the gullies and better slopes. This type develops into the primary forest by a replacement of certain of its members, and by the addition of certain other primary-forest trees which establish either in the course of the development of the secondary forest or in the shade of the association when well grown. Kamahi develops tremendously and may form an almost pure association, but, generally speaking, while the