

to dry until the following autumn. If the season is settled, the later the burn can be left the better. The seeds are sown on the ashes even while these are yet warm. In addition to this sowing there is another set of seeds well and truly planted on the forest-burn. These latter may be spoken of as "volunteers." They consist largely of indigenous species—some seeds, some spores—and also of certain wind-borne introduced species, such as spear-thistle (*Carduus lanceolatus*) and catsear (*Hypochaeris radicata*). For the first two or three years there may be a dense volunteer association of spear-thistle, and, where the grass has failed to take, the rosettes of catsear may form, even in the second year, a pure association. So long as the spear-thistle does not grow too rank or dense there is not much harm done to the grass sward, but if the big rosette plants form so that the turf becomes much shaded there is bound to be damage.

In the third and fourth years the native plants begin to manifest themselves, and particularly is this true if the take of grass has been poor or has quickly run out. A reduced grass cover means the withdrawal of stock, and it must be remembered that stock is the biggest factor in secondary-growth control. So long as we can keep stock in fairly large numbers on the area there is scarcely any danger of secondary growth. Thus the stocking of the new forest-burn will have a very decided influence in determining just what secondary scrub establishes.

THE SUCCESSION ON A BADLY BURNT AREA, UNSTOCKED.

If a burn is such that only a very poor take of grass is possible there is not the same establishment of catsear or spear-thistle. The area cannot be heavily stocked, and fern and scrub growth immediately makes its appearance. Weki also may grow out afresh from their unburnt trunks. Water-fern is the most characteristic fern of these bad burns, but soon there comes to be associated with it wineberry, lacebark (*Hoheria populnea*), tree-fuchsia (*Fuchsia excorticata*), and tutu (*Coriaria sarmentosa*). On the poorer ground there is not so much water-fern, and wineberry, lacebark, and tree-fuchsia may be absent. Bracken-fern and tutu here come in. In steep shady places there may be large masses of tupari (*Blechnum capense*), while on the open sunny knolls kamahi may re-establish. The bracken-fern phase and the succession from this point will be considered later.

In the early secondary-forest growth following on a bad burn wineberry is easily the leader, and it may form quite a dense association from an early period (Fig. 6). Tree-fuchsia and lacebark really come in a little later than the wineberry, but the three ultimately intermingle to form the first secondary-forest phase of the succession back to primary forest. As the wineberry, tree-fuchsia, lacebark, &c., raise their branches higher a certain amount of light filters in on to the floor, and so soon as this happens further species of trees establish (Fig. 7). Mahoe (*Melicytus ramiflorus*), karamu (*Coprosma robusta*), kanono (*Coprosma grandifolia*), rangiora (*Brachyglottis repanda*), hangehange (*Geniostoma ligustrifolium*), patete (*Schefflera digitata*), fivefinger (*Nothopanax arboreum*), red-pepper tree (*Drimys colorata*), lancewood (*Pseudopanax crassifolium*), tarata (*Pittosporum eugenioides*), kohuhu (*Pittosporum tenuifolium*), kaiku (*Parsonsia heterophylla*), and kaikomako