

roads and fire-breaks, was completed, and extension work here will in consequence be simplified. Arrangements are now in hand for the immediate survey of Hammer Springs Plantation, after which it is hoped that the young forests at Dungle and Waitakuna will be similarly dealt with. The adoption of a more elaborate yet highly necessary method of keeping plantation records, together with more voluminous correspondence inseparable from an expanding branch, has so increased clerical duties that it has been found impossible to undertake phases of plantation operations that are in urgent need of my personal superintendence.

#### DISEASES IN PLANTATIONS.

Perhaps a few passing references to certain tree-diseases that have more or less influenced our operations of late may not be out of place here. It is obvious that with advancing age our plantations will require more intense watchfulness for early symptoms of fungus or insect disease, as in many cases remedial measures may be applied with successful results if undertaken at the right moment. The climatic conditions this season have evidently favoured the establishment and diffusion of fungus troubles. Although *Betula alba* (English birch) is not extensively used in our scheme beyond marginal planting, it is regrettable that this handsome tree has fallen a victim to the disorder—*Melampsoridium betulinae*—that causes much disfigurement to the foliage and hastens leaf-fall. The uredo-spores and teleuto-spores are produced on birch, and the other stages on larch, which tree usually acts as intermediate host. The seedlings at Tapanui, on disclosing symptoms of the trouble, were immediately sprayed with a fungicide—bordeaux mixture—but the difficulty in applying the spray evenly over the affected surface discounted to some extent the effectiveness of the treatment. The birches will be kept under special observation, and reported upon when circumstances warrant.

Another fungus disease that threatens to be troublesome is *Lophodermium pinastri*—pine-needle cast—which affects *Pinus radiata* in both the young and advanced stages. So far only isolated cases of the fungus on our nurseries are known. From the third year onward the affection is noticeable on certain trees, although occupying situations generally regarded as favourable for pine-growing. The tree leaders of affected trees appear to gradually decrease their annual vertical development, and lateral branches become comparatively bare. In view of the enthusiasm shown by experts generally towards and the projected increased planting of this fast-growing pine, it would be wise to collect further evidence from districts where premature pine-decay has arisen from an unrecognized malady.

Each plantation contains a small area that is devoted to the production of *Pinus austriaca*. From the seed-bed stage these Austrian pines are attacked with the aphid, *Chermes pini*, and after eighteen years in permanent positions have failed to become free from the pest. Naturally progress is much interfered with, although more minute investigations disclose the fact that in humid situations, where tree-development is more rapid, the insects are not so numerically strong. In a great many instances, where the Austrian is used in admixture with one of the more healthful pines, early suppression of the infested tree may be looked for. An interesting demonstration of the comparative resistance to the needle-shedding fungus of the European larch (*Larix europaea*) and the Japanese species (*Larix leptolepis*) is in evidence at Dusky Hill Plantation, where side by side may be seen the two species growing in precisely similar conditions. Trees of the European species under stress of a trying dry summer have been almost entirely defoliated, whilst the needles of their Japanese neighbours, even at this late date, are still hanging tenaciously to the twigs. The European larch, however, has proved so far to be a slightly faster grower, although there can be no doubt that it is more susceptible to the premature needle-shedding, and consequently more liable to decay before the millable stage has been attained. The thanks of the Department are due to Mr. A. H. Cockayne, Biologist to the Department of Agriculture, for his cheerful co-operation in research matters.

#### GENERAL.

Although considerably over three million trees will be available for transportation from the nurseries to the operating plantations this season, our output will depend a good deal upon the condition of the labour-market during the approaching winter and spring periods. The anticipated success was not achieved at Tekapo Plantation; but in addition to undertaking the replanting of failures here another small area in the locality will be planted out with hardy trees suitable for the conditions.

Latest reports from Omarama disclose the fact that the experimental work conducted there was very successful. Should the Department at any time have occasion to use any portion of the large afforestation reserve adjoining, information already secured will enable us to launch out with confidence.

In compliance with military demands the gradual exodus of officers and experienced employees is taking place, and additional duties are in consequence imposed upon those remaining. Already, however, the strain is being keenly felt, and the temporary cessation of expansion work will require to be considered should the official list be further depleted.

I have to express my gratitude to the various officers, who have cheerfully assisted me to carry on the year's operations satisfactorily.