

## CHAPTER II.—RESEARCH AND EXPERIMENTS.

## 1. FOREST PARASITE BIOLOGY.

As is usual in times of economic stress, the Service was compelled to reduce outlay on this most important branch of its work.

As a result of partial reorganization, the Forest Biological Research Station at Nelson was closed soon after its official opening. Forest entomological research on a reduced scale was continued as a function of the Forest Service alone, and the forest mycological section at the Department of Agriculture's Plant Research Station continued without the extensions that had been planned for the year. Despite these handicaps, useful, if restricted, work was done.

Insectary rearing of beneficial and potentially beneficial insect parasites was continued, and pertinent life-history observations were recorded. Liberations were made of the following insect parasites, host-names being added in parentheses: *Rhyssa persuasoria* (*Sirex noctilio*); *Anaphoidea nitens* (*Gonipterus scutellatus*); *Pseudoleucis benefica* (*Eriococcus coriaceus*).

A study was begun of the curious alate but apparently non-migratory forms of *Pineus* (*Chermes*) *pini* Börn. that occur in New Zealand in the late spring.

Two entomological papers were published in Vol. 13 of the *New Zealand Journal of Science and Technology*, both dealing with insect parasites of exotic forest-trees. In the same journal was published an article by Mr. L. J. Dumbleton, B.Sc., on spruce-aphis investigation. Reprints of this were issued as the single separate bulletin of the short-lived Forest Biological Research Station.

The mycological work dealt principally with the causal organisms of what has provisionally been termed "pine-wilt" disease. Field symptoms of this condition have been known for some time. Continuous field observations have shown a steady increase in its incidence, although it has as yet never been found of epidemic virulence. Laboratory-work added to the field-work has now established the fact that probably two organisms induce similar symptoms, and that their damage can be closely correlated with climatic conditions. The practical result of the investigation, when completed, will probably be a restriction of the altitudinal limits within which *Pinus radiata* can be successfully grown to timber size. An interesting and significant detail that has been established during the investigation is the occasional infection of internal tissues of coniferous seeds with such weakly parasitic organisms.

Two parasites hitherto unsuspected in New Zealand have been noted, and in one case, at least, will have a marked effect on silvicultural practice. These are an unidentified *Armillaria*, apparently parasitic on native-tree roots and infecting *Pinus radiata* roots in newly felled bush country in the North Island and an *Endothia* species on sweet chestnut in Marlborough.

Studies of mycorrhiza of exotic conifers have been commenced; and a beginning has been made with standardized cultures of decay organisms for determination of toxicity of timber-preservatives.

## 2. ECOLOGY AND SILVICULTURE.

As in past years, organized investigation has centred round kauri in Waipoua and rimu in Westland, although the scale of operations has been somewhat reduced. The inventory and stock map (for kauri only) have been completed for Waipoua Forest, as forecast in last year's report; and, as many misconceptions regarding this area are prevalent, the outstanding features are set out here in tabular form:—

Kauri forest—							Acres.
Quality I .. .. .	..	..	..	..	..	..	5,601
Quality II .. .. .	..	..	..	..	..	..	1,996
Quality III .. .. .	..	..	..	..	..	..	1,432
Rimu-taraire forest .. .. .	..	..	..	..	..	..	14,924
Scrub and open country .. .. .	..	..	..	..	..	..	14,325
Trial exotic plantations .. .. .	..	..	..	..	..	..	301
Roads, rides, &c. . . . .	..	..	..	..	..	..	106
Total area .. .. .	..	..	..	..	..	..	38,685

To interpret this correctly it must be remembered that quality classes in this case are based on millable volumes per acre, and that the kauri association is a succession phase and not a forest climax. Quality I areas are, therefore, not rapidly growing and thrifty stands in a silvicultural sense, but, on the contrary, contain a majority of dead and slowly dying giant trees, with aggressive hardwood species ready to succeed at every kauri death. The dying of a kauri is, moreover, a slow process, and the gradual change usually escapes the eye of the intermittent visitor, who is apt to conclude that the kauri forest is everlasting, even in terms of geological and ecological time. An interesting but unfortunate example of the slowness of this death, even when it is much accelerated by human interference, is furnished by the trees near the public road. This road was formed in the period 1926–28, and extreme care was taken by the Public Works Department to prevent all avoidable damage to marginal kauris. Despite this care, many trees along the road are now, after six years, showing unmistakable signs of approaching death. These and similar facts, which were previously matters of opinion, are now being put beyond dispute by recording of constant observations, and the establishment of the Forest Experiment Station is even thus early being abundantly justified. Nineteen special observation plots have been laid out to deal chiefly with different phases of kauri-regeneration and the requisite environment.