

Kauri and Northern Forests.

Mr. W. R. McGregor, M.Sc., of Auckland University College, reports substantial progress in his researches into the ecology, life-history, light requirements, fruiting characteristics, and other silvical phenomena of the kauri and other trees of the northern forests. The floristic aspect of forest ecology has again received considerable attention, including the study of the composition of the forest community in its various phases, the tracing of the vegetable succession leading by many stages to the ultimate development of the "climax" forest type, and the fluctuations which this mature formation exhibits in consequence of environmental conditions. "It is only in the light of an accurate analysis," states Mr. McGregor, "of each of the habitat factors that their individual and collective effect in influencing the succession, in moulding the forest type, and in ultimately determining the fate of the formation, can be rightly appreciated. Without such an appreciation, any interference with a natural formation of such complexity is far more likely to lead to irretrievable disaster than to successful economic management. It would be difficult to conceive a case in which the system of habitat factors presented greater complexity than in the mixed forest of New Zealand. With regard to rate of growth, many measurements have been recorded of trees growing under diverse conditions, and, while it is too early to draw definite conclusions, the probability is that as the kauri forests come under management a material increase in the growth-rate of kauri will be secured. The evidence so far available makes it plain that the regeneration of kauri forests for commercial purposes is perfectly practicable. In a period varying from 135 to 150 years kauri can be grown to exceed 7 ft. in girth. In good localities the growth-rate is distinctly faster. It is proposed to continue the work steadily during the coming winter, and it is hoped that more financial support will be available this year in order that a comprehensive series of field experiments may be conducted in the spring and summer. The wide field which the investigation opens up, the complexity of the several problems, and the urgent demand for their practical solution, also the continued absolute lack of skilled assistance and uncertainty in employing casual helpers, indicates the difficulties being encountered."

The Taxad Rain Forests.

Very distinct progress has been made by Mr. C. E. Foweraker, M.A., F.L.S., of Canterbury University College, in his research investigations into the ecology and silvics of the Westland rain forest. The main aim of this research is to discover the processes of regeneration of the taxad forest as a whole, and the time taken by these processes, so that it will be possible to determine the best silvicultural systems to be applied in assisting such processes. During the past year field observations were made throughout the Westland taxad forest from Hokitika south to the Waiho River. One very important interim conclusion relates to the very potent edaphic factor of silting, which kills kahikatea but aids totara. In Westland, totara stands begin on shingly areas, which are afterwards silted up, followed by the development of higher tiers of roots as the silting-up proceeds. Totara seedlings do not appear on the floor of mature stands, but only in clearings and where the soil is fairly thin or shingly, as already described. This indicates that totara evidently requires full light, and germinates in dry conditions where other forest-trees will not grow and oust it. The edaphic or soil condition is the chief limiting factor in the growth of any stand in Westland, where rainfall, wind, temperature, and general aspect are approximately constant, and this is especially so in the case of that very valuable and fast-disappearing species the silver-pine, which is most prolific in regeneration, and submits well to transplanting. For these reasons, and the fact that owing to its light-resisting qualities when young it apparently succeeds kahikatea and rimu in some areas, it is probable that regulated forests of silver-pine can be easily established, and will, provided its rate of growth is found to be moderately fast, prove eminently successful.

In his third annual progress report Mr. Foweraker states: "It is to be noted with gratification that forest fires are becoming less frequent in Westland. It was quite the usual procedure for a logged area to be swept by fire again and again, thus destroying all chances of active regeneration of a taxad vegetation for centuries."

The Growth and Structure of New Zealand Taxads.

The subsidized studies commenced at Canterbury College in 1921-22 by Miss Flora B. Murray, M.A., and Mr. E. W. Bennett, M.Sc., under the direction of Professor Charles Chilton, M.A., D.Sc., and Mr. Foweraker, have been continued during the year, and good progress has been achieved. Unfortunately the past season was a bad one for seed-production, so that lack of material handicapped Miss Murray in her laboratory research into the germination and seedling growth of *Podocarpus* and *Dacrydium* species. Mr. Bennett has notified interim conclusions on the formation of secondary growth rings almost every year in certain of the taxads, but much verification of this is needed before definite principles can be laid down. When finalized, these conclusions will have an important bearing on the rate of formation of wood-tissue—a matter directly affecting forest-management.

SILVICULTURAL RESEARCH.

In addition to the ecological and silvical data which are being amassed, grouped, and summarized into general principles by trained botanists, as described in the last section, there still remain purely forestry problems such as methods of planting, drainage, optimum number of trees per acre, degrees of thinning, mixture of species in one crop, grazing within the forest, the amount of loss from forest fires, simple methods of cutting to assure natural regeneration, growth and yield of timber,