**IN NEW ZEALAND CONTEMPORARIES**

**NEW ZEALAND JOURNAL OF AGRICULTURE**


The six more important cypress species used in farm planting are considered. These are Lawson cypress (*Chamaecyparis lawsoniana*), macrocarpa or Monterey cypress (*Cupressus macrocarpa*), Bentham's cypress (*C. lusitanica* var. *benthamii*), Arizona cypress (*C. arizonica*), Mexican cypress (*C. lusitsanica*) and Mediterranean cypress (*C. sempervirens*). A general description of the two genera is given and, for each species, an account of its habit, appearance and varietal differences, soil and drainage requirements, value as a shelter belt and as a trimmed hedge, spacing and use in mixtures, and method of propagation.

The outstanding role of *C. macrocarpa* in providing farm shelter and timber of proven value is stressed; also its value in suppressing gorse and other weeds, and its tolerance of coastal conditions. Bentham's cypress will succeed on sites too wet for either macrocarpa or Lawson cypress, while the limited experience with Arizona cypress indicates a greater tolerance of dry sites. Apart from macrocarpa there is little evidence yet available on the properties and uses of the wood of locally grown cypresses.

**NEW ZEALAND MANUFACTURER**


In a paper presented at the E.S.T.I.S. Conference, 1951, at Healesville, Victoria, the writer has drawn attention to some of the characteristic features of *Pinus radiata* trees in untended forests growing on the North Island pumice lands. The radial gradient from low density wood at the core to good quality wood towards the outside of the logs, the notable annual height growth, the large number of laterals in the major whorls and their rapid diameter growth and the large pith are the factors which determine the grade of the sawn product from the 25-year-old stands. In older age classes the incidence of encased knots resulting from adherent dead laterals, and the formation of a substantial heartwood lead inevitably to a further diversification of grades. Requirements of many industries may be met by grades designed to yield specific percentages of clear or good quality "cuttings" as distinct from those other grades in which pieces are used full length for constructional purposes requiring good strength, or for boards suitable for machining and subsequent painting or natural finish. Brief mention is made of the principal export grades and their characteristic uses.

**PROBLEMS ASSOCIATED WITH TIMBER SUPPLY, DISTRIBUTION AND USE.** W. C. Ward. Vol. 3, No. 6, December, 1951.

This paper by the Inspector-in-Charge, Commercial Division, N.Z. Forest Service, was delivered to the thirty-sixth annual conference of the New Zealand Timber Merchants Federation.

New Zealand's timber production has increased 66 per cent from 316 to 525 million bd. ft. between 1939 and 1951. While the North Island increase has amounted to 74 per cent, that of the South Island has only been 28 per cent of its pre-war figure. In the North Island indigenous production increased from 169 to 226 million bd. ft., but in the South Island it declined from 119 to 106 million bd. ft. Concurrently the cutting of exotic timber was expanded from 25 to 129 million bd. ft. in the North Island, but from 22 to only 54 million bd. ft. in the South Island. During the next four years it is expected that North Island indigenous timber production will be sustained at about the current level while the only limit to a continuous increase in exotic timber production is manpower.
In the South Island, however, difficulty is anticipated in maintaining current level of production in either indigenous or exotic timber. It has already become necessary for the Government to restrict the export of insignis pine from the South Island to conserve supplies for domestic requirements there.

The past year has seen noteworthy progress in extending and consolidating the use of insignis pine as a building and industrial timber in New Zealand, but merchants are still supplying far too much in a poorly graded, stained and unseasoned condition. The grading of insignis pine is not yet established on a permanent basis; much more attention must be paid to grading if manufacturers are to continue to extend the use of this species.

The quantity of insignis pine being exported to Australia is still below the amount required to assure our imports of hardwoods. Any curtailment of North Island export to make good the temporary domestic shortage would undoubtedly cause a lack of confidence among Australian interests to the ultimate detriment of the New Zealand timber merchant.

Extension of boric acid treatment of tawa is welcomed. Failure to adopt correct common or botanical names for the New Zealand beeches is hindering the merchandising of these timbers now increasing in supply and popularity.

NEW ZEALAND SCIENCE REVIEW

UNRAVELLING FOREST HISTORY IN NEW ZEALAND. Vol. 9, Nos. 1—2, January-February, 1951.

Under this title is reported a symposium of three papers presented at a meeting of the Biology Section, Wellington Branch, Royal Society of N.Z., on October 24th, 1950.

1. New Zealand Plants and their Story: Clues to the Past F. W. Harris.

In the first paper Harris points out that, whenever a detailed study of vegetation is undertaken, the question of ancestry assumes vital importance. Present relationships and distribution can be understood only when there is an adequate knowledge of fossil history. With the aid of diagrams the "palaeozealandic" flora is discussed in relation to climatic changes through geological periods. Three periods of flora change are noted, one corresponding with the rise to dominance of the angiosperms in the Cretaceous, one in the Oligocene, and one in the post-Miocene cooling which culminated in glaciation. The importance of pollen and spore evidence is stressed and illustrated in relation to the Wallaceville Swamp near Wellington, believed to be about 7000 years old.

Fergusson describes the determination of age of deposits by radiation methods based on the carbon isotope C-14, on uranium-lead, on uranium-helium, and on rubidium-strontium. The first method is useful in dating carbonaceous matter 500 to 15,000 years old.

New Zealand is fortunate in having well dated carbonaceous deposits covering every major division of the Cretaceous and Tertiary and, in at least two localities, the record goes back to Jurassic times. Couper emphasises the dominant role of spore and pollen flora in this record. The known geological record of the more important families and genera is illustrated diagramatically.

Nothofagus of the "menziesii group" is present from Cretaceous times, though the "fusca group" has not been identified in beds older than Pliocene. The succession of floras indicated by spore and pollen fossils so far examined reveals four inter-grading phases of forest history. First, there is a very distinct Triassic-Jurassic flora, characterised by the absence of angiosperms and by the dominance of ferns, fern-like plants and gymnosperms. Secondly, there is an early Cretaceous to upper Eocene flora characterised by the incoming of the angiosperms and by an assemblage of extinct conifers comprising the dominant forest element. The third phase is transitional and covers the Oligocene to middle Miocene; a number
of important families such as the Myrtaceae and Compositae appear; conifers played a minor role in the forests of this period; beech forests are clearly indicated, and it appears to have been a time of active speciation among the beeches. Finally, there is the upper Miocene-Pliocene flora of essentially modern aspect.

ANIMAL INFLUENCES ON FOREST AND HIGH COUNTRY SOILS. Vol. 9, No. 9, September, 1951.

Three papers from a symposium on marginal lands held at the Seventh Science Congress, Christchurch, May, 1951, are published under this title.

1. **Forest and Forest Animals** John T. Holloway.

2. **Estimation of the Effects of Deer and Opossums in High Country** R. I. Kean.

3. **Damage by Deer in the Northern Kaimanawas** B. D. Van't Woudt.

Holloway propounds the axiom that, if we are to seek a full understanding of the interactions of the indigenous forests and exotic animal invaders, we must, first of all, seek an understanding of the forests themselves. Not until we understand the habitats can we logically proceed to a study of habitat modification. The distribution, composition and structure of the many forest types must be known and their origins and evolutionary trends understood before changes consequent on animal introductions can be appreciated. No two forests or types of forest will react in exactly the same fashion to browsing, were this ever of equal intensity and without the inevitable fluctuation in population. The food habits of the animals are in a constant state of flux from the moment of liberation until the final adjustment of population to food resources is completed: at no two periods during this time will the apparent effect of the animals on the forest appear to be the same.

Studies of the interactions of forests and forest animals must be conducted with a full appreciation of all forest values. The object of forest management is not the maintenance of the status quo, were this possible, but the preservation or enhancement of actual and potential values in terms of timber production, watershed protection, etc. Fundamentally feral animals may be regarded as an addition to our forest resources to be nurtured where possible, but only if and when it can be shown that such a course will not lead to impairment of major forest functions. Exotic animals are now essentially part of the forests themselves: problems of forest management and forest wild-life management are indissolubly linked.

In the second paper Kean states that there are now few localities in which deer form part of a balanced and stable ecosystem. Even where deer are indigenous, a general reduction in predators has often led to over-population. In New Zealand the problem calls for research in deer control and study of plant resistance to browsing. Of the nine species of deer established in New Zealand only the red deer (*Cervus elaphus*) is a national problem. The writer traces the process of establishment of a hypothetical deer colony in an area of wet mixed forest.

Heavy forest is not favoured by deer, but during the early occupation of country the availability of preferred foods in the shrubs and ferns of low altitude climax forest causes such areas to be used temporarily. But with deterioration of food quality they tend to become transit areas and recovery occurs with an increase in unpalatable or browse-tolerant plants. Climax forest at higher altitudes is more vulnerable. Not only are the available plant species fewer but the ground cover contains more palatable ferns and shrubs, and deer use this forest much more than at lower levels. Moderate use seems to result in habitat improvement for deer.

The consequences of deer use are discussed in relation to population changes and browsing habits. Deer do not occupy country uniformly, and, even when the over-all population is substantially reduced, may continue in damaging concentration on vulnerable steep slopes. Deer damage and consequent erosion in high rainfall areas are considered with special reference to the Tararua Range. Low-rainfall beech forest and grassland presents a simpler situation. They are areas favourable to the rapid spread of deer while the food resources are more limited, with seedling beech becoming of greater importance in the diet. Control methods and problems are discussed. The writer concludes that food is seldom a limiting factor to deer population in a particular area.
The opossum (*Trichosurus vulpecula*) is able to exercise unrestricted choice of whatever grows within its home range, but is much more restricted than deer in the food which it can utilise. Generally it requires arboreal cover but can occupy grassland permanently if the climate is mild and adequate shelter exists. It is a slow breeder with natural limitations imposed by cover and food conditions. In the absence of deer or equivalent browsing animals, opossums usually do not prevent forest regeneration, although they may modify forest composition considerably. However, a combination of opossums and deer is a deadly one.

Van’t Woudt discusses the effect of deer on the northern part of the Kai-manawa Mountains where they were introduced in 1905. The direct and indirect ecological effects of deer browsing in this red beech-silver beech forest are discussed. Food sources are classified according to their present and prospective availability and according to their significance in the diet of deer. Some unpalatable plants, both indigenous and exotic have increased and are of significance in maintaining soil cover. With the disappearance of important expendable food sources, it appears that there is now more or less of a balance between deer population and available food though any significant increase or decrease in hunting could be expected to alter this balance considerably.

The writer considers that conditions for beech regeneration may have improved as a result of destruction of the undergrowth by deer, but browsing is also restricting the development of seedlings, particularly near the margins of the forest. Where windthrows have coincided with seed years, survival of beech regeneration within the protection of the fallen trees has been satisfactory.

NEW ZEALAND JOURNAL OF SCIENCE AND TECHNOLOGY


Author’s Summary: The results of pressure treatments of rimu and matai sapwood with aqueous solutions are given. Gross absorption percentages obtained with the same combinations of initial air and solution pressures were found to be similar for both species. Absorption of cold solutions, particularly into rimu, was very slow, but absorption rate increased rapidly with increase in solution temperature. High negative correlation coefficients were found between net absorption and timber density. Net absorption decreased with rise in initial air pressure, but increased with rise in temperature.


Author’s Summary: The toxicity of four water-soluble materials to wood-destroying fungi was tested by the wood-soil contact culture method of Leutritz. Tests were made with *Pinus radiata* blocks using the following test fungi: *Coniophora cerebella* (two cultures), *Lenzites trabea*, and *Poria vaporaria*.

Loadings of salt in the blocks were expressed as the percentage of dry salt in oven-dry wood, w/w. A toxicity index expressing the loss in weight of the treated block relative to the loss in weight of the untreated block from the same jar was calculated, the index being 100 when treated blocks were unrotted, and 0 when losses in weight of treated and untreated blocks were equal.


Author’s Summary: Tests have shown that zinc chloride impregnated in wood in quantities equal to 0.18 per cent of the dry weight of wood prevents development of *Anobium* larvae. At concentrations of 0.11 per cent and below larvae were able to survive. Comparable figures for other materials are sodium

**Author's Summary:** The ratio of core loading to board loading of boric acid in green tawa (4 in. by 1 in.) treated by hot diffusion in 2 per cent solution was found to increase from 0.3 immediately after treatment to 0.5 in two days, 0.8 in six days, and 0.9 in 14 days after treatment.

EFFECTS OF SOME VARIABLES UPON LOADING AND DISTRIBUTION OF BORIC ACID IN THIS TIMBER. K. M. Harrow. Vol. 32, No. 4; B, January, 1951.

**Author's Summary:** Experiments are described to determine the effect of the treatment variables, temperature, concentration and time, and the wood variables moisture content, specific gravity, and wood angle upon loading and distribution ratio of boric acid in one-inch green tawa (Beilschmiedia tawa Benth. and Hook. f.) impregnated by diffusion.

Of the factors tested, solution concentration and time were found to have the greatest effects upon loading. An empirical equation

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\frac{\text{Concentration} \times \sqrt[4]{\text{time}}}{\text{loading}} = \text{constant}
\]

was derived from experimental data. At 83°C the value of the constant was 10.

The effect of temperature upon loading, in the range between 71°C and 93°C was significant but small.

Wood angle had a highly significant effect upon loading. Specific gravity had a significant effect, but the effect of moisture content was not significant at values occurring in the timber treated.

The distribution ratio of boric acid in boards sampled 14 days after treatment was most affected by wood angle, the ratio of quarter-sawn boards being relatively low.

When borax was used as the diffusing salt, equivalent boron loadings obtained were approximately three-quarters those secured with boric acid under the same treatment conditions.

Agitation during diffusion treatments did not produce any significant effect upon loading.

Loadings of boric acid adequate for preservation of tawa against insect attack were obtained in green boards one inch thick with treatments for one hour in 4 per cent solution at 83°C.


**Author's Summary:** An experiment to determine a suitable soil moisture content to use with a wood-soil contact culture technique for laboratory testing of toxicity of wood preservatives against fungi is described. Pinus radiata water-treated control-blocks placed on soil with 22.2 per cent moisture content had a mean moisture content of 27.9 per cent. Allowing for loss of water from jars during test period, an initial soil moisture of 25 per cent would be suitable for use in tests.
Salt treatment greatly affected block moisture contents. Over soil at 22.2 per cent moisture, blocks with loadings of 1.0 per cent boric acid had moisture content of 32.9 per cent; those with loadings of 2 per cent zinc chloride had a moisture content of 50.4 per cent.


Author's Summary: The results of an investigation of pressure treatment of Pinus radiata are given. This timber can be speedily impregnated with cold aqueous solutions. Complete penetration of all timber in a charge can be attained by a gross absorption of 80 per cent. of voids in pine. This can be accomplished by application of selected solution pressures which vary with the initial air pressure used. Penetration is accelerated by higher solution pressures. At least 150 lb. per sq. in. with initial air at atmospheric pressure, and 200 lb. per sq. in. with 10 lb. initial air pressure is required for impregnation in less than one hour. Kickback increases with initial air pressure up to 10 lb. per sq. in.; higher initial air pressures do not increase kickback. There is no advantage in using initial vacuum as it involves an extra operation and timber so treated requires much drying. Atmospheric pressure appears to be the most suitable initial air pressure for P. radiata. Even with complete penetration, the core loading may be only half as the average loading of treated pine.


Among aspects of timber insect biology and control being investigated at Plant Diseases Division is the susceptibility of timber to insect attack, including variation in this susceptibility both within and between timber species. An experiment was commenced in 1945 to explore the variation in susceptibility to Anobium from bark to core in four trees of Pinus radiata, and to compare the susceptibility of this timber with that of kahikatea (Podocarpus dacrydioides).

The experiment is described and the following points noted:

1. None of the pine boards was as susceptible to Anobium attack as were those of kahikatea.

2. One pine tree was much less susceptible to attack than the other three.

3. Susceptibility decreased from bark to core in the four P. radiata trees.

4. In all boards other than kahikatea and the outer ones of three of the pines, the number of Anobium beetles that emerged was less than the sixty originally used to infest each board.

The trial is not considered sufficiently extensive to warrant generalised conclusions.


Author's Summary: Results of experimental treatments on taws (Beilschmiedia tawa Bentham and Hook. f.) by pressure impregnation are presented. With treatments at 65°C., and with a final solution pressure of 200 pound per square inch, net absorption, expressed as a percentage of oven dry wood weight, ranged from 79.8 per cent after an initial vacuum of 20 inches of Hg., to 49.1 per cent after treatment under air pressure of 20 pound per square inch. A safety factor was computed from the loading data to account for the variation in salt loading between boards, and the distribution of salt within boards.
LEACHABILITY OF SOME WATER-SOLUBLE WOOD PRESERVATIVES.

Author's Summary: An experiment is described to determine the extent to which leaching occurred when building timbers, impregnated with boric acid, tanalith, or zinc chloride, were exposed to the weather for periods up to six months.

Changes in loading of preservatives were determined by chemical analysis of cross-section and layer samples taken from unexposed and exposed timbers.

Losses of boric acid and tanalith materials from wood in six months were 30 to 60%, while the loss of zinc chloride was between 16 and 24%.

Leaching was chiefly from the outer layer of wood.


Author's Summary: A brief account is given of the chemistry of the resinous constituents from the woods of a number of species of Podocarpus and Dacrydium. The neutral portion (0.7 per cent. on the dry wood) of the resin extracted from the wood of Dacrydium cupressinum with alcohol is shown to contain the diterpenoids totarol, ferruginol, 9-keto ferruginol (apparently identical with sugiol), the sesquiterpene macrocarpol, a phytosterol (probably B sitosterol), and a crystalline wax. A structure for totarol is suggested and discussed briefly. This chemical evidence suggests a close relationship of D. cupressinum to Podocarpus, and absence of any relationship to Dacrydium.


In continuation of the study of the resinous constituents of the woods of the Dacrydiums the result of the examination of the resin extracted from D. bidwillii with acetone is recorded. The resin was found to consist mainly of the diterpene alcohol, manool, and is therefore similar to the resin obtained from D. biforme and D. kirkii.