

been absorbed on essential defence works. Not unexpectedly, the number of permits for domestic buildings reported by the Government Statistician for the year ended 31st March, 1942, was only 4,565, as compared with 6,011 for the previous year. The increased production of insignis pine failed to meet the country's general boxmaking requirements, and the deficiency was filled with rimu and matai.

Prices of timber and timber products were maintained under strict control by the Price Tribunal. To cover increased costs resulting from the new award and the general cost-of-living bonus price-advances were approved which averaged less than 4 per cent. on previous levels.

75. *Timber Imports*.—The Customs returns scheduled in Appendix IV show a total import trade of 22,000,000 board feet for the calendar year 1941, as compared with 15,000,000 board feet for 1940, Australian hardwoods alone increasing from 12,000,000 to 18,000,000 board feet, all of which, however, was of an essential character.

76. *Timber Exports*.—According to Appendix V, Customs returns show a total export of 16,700,000 board feet for the calendar year 1941, as compared with 17,400,000 board feet for 1940. Owing to heavy domestic demands, exports of beech, matai, kauri, and insignis pine were reduced on the previous year's figures, although slightly increased quantities of white-pine, rimu, and other timbers were released. As far as it is practicable, New Zealand and Australia are endeavouring to protect each other's requirements for essential timbers not produced in their own territories.

#### CHAPTER X.—UTILIZATION.

77. *General*.—All previous conceptions of wood usage have required universal modification under the impact of war conditions. So unprecedented has been the shortage of timber that consumers have willingly accepted whatever substitutes have been available, often with results much more successful than anticipated. Expansion in the local production of plywood, structural insulating board, and pulp-board products has offset the cessation of overseas supplies.

78. *Hardwood Grading*.—The increasing use of silver-beech for the manufacture of essential munitions, &c., has demonstrated the impracticability of existing grading rules, and, in co-operation with the wartime Beech Marketing Authority, a new set of rules is in course of development not only for beech, but also for tawa and other hardwoods.

79. *Timber Profiles*.—Due to pressure of timber-control activities, only limited progress has been possible with the standardization of profiles for weatherboarding, flooring, and linings, but additional data is being collected and field studies initiated to establish the maximum finished widths and thicknesses which can be adopted for such profiles.

80. *Structural Grading*.—The expanded use of heavy structural timbers for war purposes has yielded further experience of value in the drafting of structural grading rules and the derivation of working-stresses.

81. *Mill Studies*.—At two mills in each of the Auckland and Nelson Conservancies the conversion of indigenous logs into sawn timber was studied, and similarly that of insignis pine in one mill each in the Wellington and Nelson Conservancies. In these latter studies, both of which were made on logs from forty-year-old trees, the bark content was 11 per cent. The New Zealand Railways were also assisted in their investigations into log-measuring practices for freight charging.

82. *Utilization of Minor Species*.—With the cessation of Japanese oak imports and reduced supplies of Australian hardwoods, considerable interest has developed in the possibility of using tawa, taraire, mangeao, and other indigenous hardwoods as substitutes. Tawa as the most plentiful and widely distributed species is being cut in increasing quantities for finishing, interior fitments, and furniture, and some 15,000 board feet were kiln-dried at the Waipa mill to demonstrate the practicability of kiln-drying 1 in. and 2 in. stock green from the saw. The results have been excellent, and a number of office desks of modern design have been constructed to bring out effectively the attractive grain of the wood. Before assembly, the parts were treated with the Department's recommended furniture-wood preservative consisting of pentachlorophenol in a solution of petroleum oil. This preservative causes no swelling or subsequent shrinkage and provides a perfect protection against the powder-post beetles (*Lyctus* spp.) so common in oak furniture and which hitherto have been a serious menace to tawa. The successful kiln-drying of tawa and the treatment of furniture parts before assembly now allows the trade to develop the use of this timber as a first-class substitute for oak.

83. *Timber Mechanics*.—During the year 1,143 standard tests were made, covering the principal mechanical properties of Samoan-grown teak, Fijian kauri, European larch, and insignis pine. The results show that Pacific-grown teak and kauri possess strength properties similar to Burmese teak and New Zealand kauri respectively, and may be largely used as substitutes for these timbers. The larch available for study yielded only a small number of clear specimens suitable for standard tests, but additional specimens containing pin-knots were tested for use as cross-arms. The result of the insignis-pine tests indicate that it will be entirely practicable to develop working-stresses and structural grading rules based upon ring counts and springwood percentages.

84. *Box-testing*.—Specifications for numerous containers for munitions and foodstuffs for the armed forces were developed and are in extensive use. Rimu has proved much more valuable than expected as a substitute for the lighter and more easily-worked softwoods, such as kahikatea, insignis pine, &c.

85. *Microscopic Anatomy of Woods*.—In addition to routine identification work for Government Departments and other interests, the only studies undertaken have been in connection with silvicultural and timber-testing work.

86. *Specific-gravity Studies*.—Exotic forest sample plot studies have continued to supply material for specific-gravity determinations from Rotorua Conservancy, principally in the case of *P. radiata*. Other specific-gravity samples of various minor species and of slow-grown *P. radiata* from Central Otago, and eucalypt timber from North Auckland, have also been tested. In conjunction with the tests of mechanical properties, the standard specific gravity and shrinkage tests have also been carried out.

87. *Electric Moisture Meters*.—The continued use of these meters has demonstrated their utility for routine control of box-factory and drying operations. Studies are being made of their possibilities as a means of testing the moisture content of tree-seed.

88. *Kiln-drying*.—Assistance has been given to operators of drying-kilns throughout New Zealand in the solution of numerous problems. As a result of further experience in the drying of tawa and silver beech, regular kiln-drying schedules for these timbers are now available to the trade.