

Failures of clay roofing-tiles were found to be due in some cases to frost damage and in others to the presence of comparatively large amounts of soluble salts.

The suspected deterioration of concrete in a large irrigation dam was investigated, preliminary tests seeming to indicate attack on the concrete by an aggressive water.

A case of serious failure of concrete sewer-pipes and other underground pipes from the same locality showed that the concrete had been attacked by a very aggressive ground water containing 88 parts per million of free carbon dioxide and only about 18 parts per million of calcium bicarbonate, calculated as calcium carbonate.

Advice has been given on a wide range of painting problems, and analyses have been made of a large number of samples of paint for the Housing Construction Department, State Advances Corporation, and other Government Departments.

A comprehensive examination of paint failures on State houses in Auckland was carried out and a full report, with recommendations, was prepared.

Three extensive paint-test fences were erected, one each in Auckland, Wellington, and Christchurch. The purpose of the fences is to determine by exposure to the weather the best types of paint for exterior wood surfaces, and to investigate such points as the effect of the preservative treatment of timber on paint durability and the possible value of a two-coat painting system in place of the usual three-coat system. A fairly wide range of types of finishing coats, paints, and primers is included in the tests. Practically all the paints used in these tests were formulated and made in the Laboratory.

Panels coated with the paints used on the test fences are being exposed in the Laboratory's "weatherometer" (accelerated-weathering machine). Thus it is aimed to establish a useful correlation between exposure out of doors and in the machine so that accelerated tests in the latter will provide an indication of how paints will behave in service.

The investigations on casein paints carried out in collaboration with the Dairy Research Institute were continued during the year. Interesting results have been obtained from exposure tests made in dairy factories and other food-manufacturing plants.

An interesting large-scale failure of comparatively new paint-work was found to be due to the use of an undercoat containing lithopone, coupled with a delay of several months before the application of the finishing coat.

PLANT DISEASES DIVISION, PLANT RESEARCH BUREAU

Testing Toxicity of Wood Preservatives

(a) *Biological Evaluation of Toxicity with Anobium punctatum*.—The larval transfer technique, which was developed to give a rapid measure of relative toxicity, has been abandoned, since results secured were found to be unrelated to actual toxicity determined by the egg-laying technique. Using the latter, tests were laid down last flight season (December, 1946, to January, 1947) to ascertain toxic points of thirteen materials of possible commercial application. These will be recorded before next flight season.

(b) *Toxicity of Thin Layers*.—Tests have shown that some newly hatched larvæ can penetrate through thin layers produced upon the surfaces of twenty minutes' cold-dipped matai and white-pine by solutions of zinc and copper naphthenates at concentrations of 2 per cent. and 1 per cent. of metal respectively.

(c) *Treatment of Infested Buildings*.—Two approaches are being made to this problem: one is development of a solution to reduce larval population to a low level by fumigant action of materials applied by brush or injected into flight holes; the other, production of a suitable contact poison which will remain effectual upon the surface of timber for four years in order to kill adults emerging from any larvæ not destroyed by the fumigant. Suitable laboratory technique has been developed for testing materials for these purposes, and tests are in progress.

(d) *Mass Breeding*.—Fifteen hundred pairs of *Anobium* beetles were placed for mass breeding last flight season to provide material for future work.