

Insects Infesting Stored Cacao.¹

THE Empire Marketing Board, in establishing a Committee on Infestation of Stored Products, has recognised the importance of dealing with the losses, occasioned both in transit and storage, by insect and other damage to a wide range of foodstuffs. By means of a series of grants made to the Imperial College of Science, the Board has enabled that institution to establish at Slough a special laboratory for stored products research. At present, attention is being mainly concentrated on the insect problems affecting cacao and dried fruits, and on fungus damage to cacao and copra. This work is under the general direction of Prof. J. W. Munro, and, as experience and facilities increase, it will doubtlessly embrace the study of other stored products in addition to those mentioned.

A report on insect infestation conditions prevailing in cacao stores in certain of the London docks and wharves, has been prepared for the Marketing Board's Committee on Stored Products by Messrs. J. W. Munro and W. S. Thompson. This shows that the prevention and control of the losses at present occasioned by cacao insects can only be attained by co-operation on the part of all concerned, since the infestation occurs throughout all stages of the cacao industry.

The problem of insect infestation in stored cacao has three main aspects, namely, (a) in the exporting country; (b) in wharves and warehouses of the importing country; and (c) in the cocoa and chocolate factories of the importing country. Cacao insects, for example, may enter the produce in the exporting country and their descendants eventually become transferred to chocolate factories far inland in the importing country. This may result in the occurrence of such insects in boxes of manufactured chocolates which may thus reach the consumer. Furthermore, certain cacao insects may affect other products stored in proximity to cacao and considerably reduce the value of such products.

The chief insects infesting cacao belong to three

¹ "Report on Insect Infestation of Stored Cacao." Prepared for the Empire Marketing Board's Committee on Infestation of Stored Products by J. W. Munro and W. S. Thompson. (London: H.M. Stationery Office, 1929.) 1s. 6d. net.

species. The moth *Ephestia elutella* Hb. is the most important, and its larvæ attack not only cacao-beans but also a great variety of other stored products, including biscuits, figs, chocolate, many kinds of grain, dried fruits, etc. It is, consequently, an insect of great economic significance and is very widely distributed. The larvæ of another small moth, *Corcyra cephalonica* Staint., are less harmful, since they only occur in small numbers. Like the preceding species, it has become widespread, although it was probably originally a pest of rice and has later taken to living on other products. The third species is the Anthribid beetle *Aræcercus fasciculatus* De G., the larvæ of which eat out the endosperm of the cacao beans. It is more especially an enemy of nutmegs, and only appears to be a serious cacao pest in the Gold Coast.

The results of Messrs. Munro and Thomson's investigations in London docks and warehouses show that the above species of insects are all found infesting the cacao on arrival from overseas. Cacao received from all exporting countries indicates that infestation takes place in those countries, and if remedial and control measures are to be effective they must be carried out at the sources of the trouble. In Great Britain it is obvious that whatever measures may be taken to clean up infected buildings, the latter will be liable to become reinfested from fresh cargoes constantly coming in from abroad.

Special attention is being given to the *Ephestia* in order to ascertain the life-cycle and behaviour of the insect under varying warehouse conditions. Its responses to heat, cold, fumigants, and other treatments are being tested, and various experiments have been, and are being, conducted relative to the de-infestation of affected buildings where consignments are housed. Under present conditions, clean cargoes stored in the warehouses are open to attack, and it is evident that the problem requires concerted action both by the exporting and importing countries. These facts are fully recognised, and there is little doubt that now investigations have been initiated, we can look forward to a solution of at least some of the outstanding problems. A. D. I.

Field Strength in Broadcasting and Receiver Efficiency.

IN connexion with the field strength produced at various places by a broadcasting aerial, the paper on signal strength, by J. H. Reyner, published in the *Journal of the Institution of Electrical Engineers* for January, will be found of interest. Measurements were made in Cornwall of the field strength due to the broadcasting station 5XX at Daventry by means of a simple portable equipment consisting of a screened local oscillator and a sensitive micro-ammeter.

This equipment enabled the actual pressure in millivolts set up in a portable experimental aerial by the radiations from 5XX to be accurately measured. The effective height of the aerial being known, it was possible to convert the readings into field strength values in millivolts per metre.

The first set of readings was taken at selected points in Cornwall. The contour lines obtained seemed to indicate that the coast-line was exercising a marked absorbing effect, the field strength at Plymouth and Newquay being only about one-third that at Launceston. In the Perranporth district, the field strength on the coast-line was only about half that on the hill-top about two miles inland. The masts of the Bodmin beam station were visible from

the hill-top and this suggested that it possibly cast a radio shadow. Subsequent experimental results afford strong evidence of this shadow.

The region of bad reception extends almost in a direct line from Daventry through Bodmin as far as Redruth, the distance between the latter two towns being about 25 miles. Surrounding this area of low signal strength is a ridge of good reception. For example, as one goes out towards the coast from Truro, the signal strength first rises on either side and then falls rapidly as the coast-line is approached. The Bodmin beam station was erected some years ago, but no complaint seems to have been made hitherto of any shadow being cast by it.

There is little doubt that with an accurate method of measuring how a radio receiving set fulfils its functions there would soon be a great improvement in their design. Now that the field intensity of the radiation from a broadcast station can be readily measured, simple methods of testing sets experimentally will most probably soon be devised.

In a paper read to the Institution of Electrical Engineers on Jan. 15, H. A. Thomas, of the National Physical Laboratory, gave a method of measuring the overall efficiency of a receiver. The ultimate aim of

all measurements of the constituent parts of a receiver is to obtain the relationship between the input supplied to it and the output it gives. This is the most important of the tests, but it is most difficult to obtain accurate results.

In making the tests use was made of the screened oscillator cabin at the laboratory, which has a mercury sealed trap-door, and the long copper ventilating pipes of which are provided with three copper gauze baffles which screen unwanted radiation completely. The apparatus described covers a wave-length range from 5 metres to 30,000 metres.

The results of tests on four receivers of widely different type are given. The experiments show that the overall properties of any receiver can be specified when the input voltage required at a definite modulation percentage to produce a definite standard output signal is known at all wave-lengths within the desired range. The selectivity of the receiver is the variation of the sensitivity in the neighbourhood of certain fixed wave-lengths. The distorting properties in the audio frequency stages have also to be measured. If it is only desired to determine the range of a receiver with respect to a particular transmitting station, two characteristic curves suffice. The work carried out has been done for the Radio Research Board.

Fishery Investigations off Iceland.

THE Scientific Report of the North-Western Area Committee for 1926-27 (Rapport Atlantique, secteur Nord-ouest, 1926-27. Conseil Permanent International pour l'Exploration de la Mer. May 1929), by Prof. Johs. Schmidt, contains four papers, the first and fourth on the haddock and plaice respectively, the second and third being shorter papers dealing with bottom faunas, by R. Spärk, and the age composition of the stock of cod in East Iceland fjords, by Arni Fridriksson.

Dr. Harold Thompson's work on the haddock, "General Features in the Biology of the Haddock (*Gadus aeglefinus* L.) in Icelandic Waters in the Period 1903-1926", and Dr. Å. Vedel Tåning's "Plaice Investigations in Icelandic Waters", are both of great importance. These works deal with the stock on the feeding grounds, age composition, rate of growth, and various biological considerations. Both fishes inhabit natural sub-areas of the Icelandic plateau. For the haddock, two main regions are differentiated, one to the north and east where the coasts are exposed to the polar current, and one to the south and west which is exposed to the warmer Atlantic stream, spawning taking place in this warmer region with a maximum in April, the fish being larger at the same age than those from the north-east. It is, however, only the bottom stages of the haddock which are here described, as the eggs and larval forms have been fully dealt with by Johs. Schmidt (*Cons. Internat. Rapp. et Proc. Verb.*, vol. 10, 1902-7, No. 4). The otter trawl is shown to be efficacious and trustworthy for sampling the haddock shoals. Growth rates are calculated from the annual zones in the scales.

It is assumed, and the assumption is confirmed by biological evidence, that the Icelandic haddock are a self-contained stock cut off from interchange with those of other grounds by deep water. The first-year haddock, the product of the spawning season, like those in the North Sea, probably remain in fairly deep water, later moving nearer the coast for feeding. Except the Faroe haddock, those from Iceland grow more rapidly than any in the East Atlantic. It is thought that the feeding conditions probably account for this, although so far only a beginning has been

made in research of this kind. Sand-eel is shown to be largely eaten and rapid growth is then effected. The Icelandic haddock spawn at an age of at least one year older than is the case with those from the North Sea.

Dr. Å. Vedel Tåning's work on the plaice deals with spawning and larval forms as well as with the adults. Spawning continues from February until May with a maximum in March and April and takes place chiefly in the warmer water of the south and west, the late spawning having a great influence on the rate of growth. The maximal growth is found on the western part of the south coast. There is a marked decline in the growth along the south coast round to the east coast coinciding with the fall of temperature. Temperature and length of summer are shown to be of great importance for the rate of growth in the plaice in Icelandic waters, and probably these factors influence the rate of growth of plaice generally. Unlike the haddock, the Icelandic plaice has a higher total number of vertebræ than other known forms, and also varies much in this respect in the Icelandic area itself.

University and Educational Intelligence.

CAMBRIDGE.—The Gordon Wigan Prize in chemistry for 1929 has been awarded to C. G. Lyons, Trinity Hall, for a dissertation entitled "Thin Films, their Properties and Structure".

Applications for the John Lucas Walker studentship, the holder of which has to devote himself to original research in pathology, are invited and should be sent before July 1 to the professor of pathology. The studentship is of the annual value of £300 and is tenable for three years. Applications for the Gwynnaeth Pretty studentship, the holder of which has to devote himself to original research in the etiology, pathology, and treatment of disease, are also invited; they should be sent before July 1 to the professor of pathology. The studentship is of the annual value of £200 and is tenable for three years.

The managers of the Nita King Research scholarship for the encouragement of original research in the etiology, pathology, and prevention of fevers, invite applications from candidates; these should reach the professor of pathology before Feb. 28.

The governing body of Emmanuel College invites applications for a research studentship which will be awarded in July next. Applications (with evidence for a proposed course of research) must reach the Master of Emmanuel College not later than June 30. Preference will be given to candidates who have already completed one but not more than two years of research. The studentship has a maximum annual value of £150, and is normally held for two years.

LEEDS.—M. G. B. Howarth, senior research assistant on the staff of the Joint Research Committee of the Institution of Gas Engineers and the University of Leeds, has been appointed chief chemist to the Newcastle-upon-Tyne and Gateshead Gas Company. Mr. Howarth was awarded a University scholarship in 1920, and since then has had varied research experience on the works and in the laboratory at Birmingham and Leeds, dealing with blue and carburetted water gas plants, waste heat boilers, aeration of burners, and the products of combustion of gas appliances.

'PARENT-TEACHER' associations have been at work in the United States for more than thirty years, striving to bring about closer co-operation between home and school. No similar movement elsewhere