

country, the Tertiary deposits are alleged to contain some oil, but it is probably widely dispersed. Oil seepages reported from Glenelg River when followed up led to nothing. Prospecting carried out in this region seems to have been inspired by a widespread occurrence of bitumen along the whole southern coast of the continent, quite probably washed up by prevalent Antarctic tides.

In the Kimberley region of North-West Australia trials for oil were made at Nerrima, south-east of Broome, in 1939, but no oil or gas shows of con-

sequence were encountered. Again, in his report on petroleum prospects of the Kimberley district of Western Australia and Northern Territory, made more than sixteen years ago, Dr. A. Wade wrote: ". . . the area could not have been less favourable from the point of view of prospecting for, or for the finding of, petroleum supplies. It is more suited to the prospector for gold and other minerals . . ." One cannot escape the feeling that this last remark applies to a far larger part of the continent than many people realize.

THE RUBBER RESEARCH INSTITUTE OF MALAYA

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ABOUT ninety per cent of the rubber in the world is manufactured from the latex of the tropical tree *Hevea Braziliensis*, a native of the Amazon region of South America, but now cultivated on a plantation scale in Malaya, the Netherland Indies and Ceylon, which areas produce practically all the rubber of commerce. The story of how Sir Henry Wickham managed to secure seeds of this wild tree from Brazil in 1876, and its subsequent transfer, via Kew, to the Peredeniya Gardens in Ceylon, and thence to Malaya and the East Indies, is a fascinating one. Some of the original trees are still growing at Peredeniya. From these small beginnings, the vast plantations of the Far East have their inception. In Malaya alone the area under rubber amounted to more than three and a quarter million acres in 1937, and the exports to nearly 500,000 tons, valued at nearly 350 million Straits Settlement dollars.

The industry made enormous growth at the start; but like so many other plantation industries, it had, at a later stage, to face obstacles in the shape of lower prices and fluctuating markets following periods of over-production. The earlier planters merely cleared the forests and planted rubber and were content to collect the produce without devoting much attention to the methods of cultivation. In this respect rubber presented no difference from many other tropical plantation crops. A period of boom prices would result in the wholesale planting of areas, irrespective of soil and climatic conditions, but subsequent slumps, combined with acute competition, brought home to those interested in the industry the vital need for research and for control in the output.

With the ramifications of the rubber restriction proceedings we are not concerned; but the progress of the research work is a subject worthy of more than passing note, in view of the thorough manner in which the need has been met.

In the years immediately succeeding the War of 1914-18, the pros and cons of the matter were thoroughly thrashed out by those vitally interested in the commodity, both in London and in Malaya, and their views crystallized into the idea that a research station was needed, which would be in a position to tackle the various problems that beset the industry. The problems were many. There was first the system of cultivation. It had been considered from the first that clean weeding was essential to the successful growth of the rubber tree; but tentative experiments made by the Agricultural Department had indicated that this system was not necessarily the best, and that it resulted in the loss of much soil through erosion. Sir Lewis Fermor, in a recent report on the mining industry of Malaya, hinted that possibly as much erosion had been caused by rubber planting as by tin mining operations, which had always hitherto been blamed. Nowadays one hastens to explain this is not the case, as cover crops are the usual practice on rubber estates and clean weeding has been abandoned, and with it much erosion has been checked.

The Rubber Research Institute of Malaya was at length organized and started work in September 1926, and, after the usual teething troubles which seem to be inevitable with institutions of this nature, it can now be considered to have fairly got into its stride. A study of the annual report for 1939 gives full indication of this, and a perusal

of the 277 pages will convince readers of the thorough way in which diverse and complex problems are being investigated.

The Institute is situated near Kuala Lumpur on a suitable site and is well equipped with a competent staff and excellent laboratories and land for experimental work. The scientific work is organized into several divisions dealing with botanical, soils and fertilizers, technological and pathological problems; there are also an experimental station of 1,850 acres at which work on cultural matters is investigated and experimental field plots laid out. In addition, there is much advisory work which preserves contact with the planters throughout the area. Close co-operation is maintained with the Rubber Research Scheme of Ceylon, with the London Advisory Committee, and other scientific institutions in Great Britain, and with the British Rubber Producers Research Association. This latter body is a part of the International Rubber Research Board, and by this means close liaison has been established with other research workers in Java and elsewhere.

In the Soils Division much has been accomplished in examining the various types of soil that occur in the peninsula with regard to their suitability for rubber growing and in ascertaining the manurial requirement for each type. Erosion problems are being examined, and the various systems of establishing new plantings by the relative methods of no burning versus light or normal burning are being tested. Whilst clean cultivation has now been abandoned, it has been found in practice that the establishment of permanent cover crops is not an easy matter on certain types of soil and are certainly difficult to maintain under mature rubber. Experiments in inoculation and manuring are, therefore, being made to try to get over the difficulty.

Valuable work by the Botanical Division has been done in the provision of improved planting material. The percentage of acreage replanted with higher yielding material is still considerably less than that of Java, as the Netherlands Indies started work of this nature several years before Malaya. Much progress has now been made in selecting high-yielding trees for bud wood, the number of high-yielding clones that have been tested and approved shows annual progress and the demand for the material is greater than the supply. The stage has now been reached when the yield from the present best proved clones is unlikely to be exceeded by selection from further high-yielding trees; resort is accordingly being made to pollination between high-yielding clones, and some of the seedling clones resulting are stated to be of high promise. Further valuable work by this division is being undertaken in

testing different kinds of tapping systems, in the use of growth-promoting substances in the vegetative propagation of Hevea, and in stock-scion relationships. An interesting piece of work from which good results are expected, is in studies of the nutrition of the plant and also the connexion between leaf symptoms and various deficiencies.

The Pathological Division deals with pests and diseases. One of the chief troubles in newly planted areas is the control of root disease. Control of old stumps which are the focal points of the disease seems to be best assured by the use of sodium arsenite. An interesting piece of work is in the testing of nodule bacteria in connexion with the growth of cover crops, such as *Pueraria* and *Centrosema*, which, as mentioned above, are not always easy to establish.

The Chemical Division deals mainly in technological problems, in which direction the industry has made important advances in recent years. A new type of smoke house for crêpe rubber designed by the Institute has become popular and has been built on a number of estates. Other problems are connected with the shipment of latex, for rubber is now being transported in this form in increasing quantities in recent years. For this purpose the latex has to be concentrated. The concentrating of the latex, the preventing of discoloration, and the use of certain reagents for concentrating, are all matters under investigation. Incidentally, it is interesting to note that it has been found that different clones produce rubbers of different consistencies, some, for example, producing rubber of an abnormal softness.

It has only been possible to touch the fringe of the research work that is described in the annual report, but it is obvious that much work is being conducted on sound lines, which augurs well for the future of the industry. Plantation rubber will probably have to face competition from the artificial product in the future, for the effect of the War has been to stimulate research in the manufacture of rubber substitutes by synthetic methods, particularly in those countries which are unable to get natural rubber on account of blockade. It is satisfactory, therefore, to feel that those interested in the plantation industry, which is of such vital importance to Malaya and Ceylon, have taken steps to apply research methods with the object of raising the output per acre and reducing costs, and at the same time have realized the importance of regulating output so that the product may be made available to the whole world, when conditions again become normal, at a reasonable and stabilized price. By such methods the industry will be in the best position to meet any outside competition in the future.