THE IMPORTANCE OF AND REASONS FOR A PLANT PATHOLOGICAL SERVICE*

FROM the earliest times, domesticated varieties of plants grown for food or for economic purposes have been subject to the attacks of fungus diseases and early references to the terms "blight" and "blasting" show that they obtruded themselves on the mind of the cultivator long before their true nature was known. A community dependent on local food supplies would suffer severely from an attack on its crops of a fungus disease in epidemic form and such visitations were not infrequently looked upon as acts of God and punishment for past misdeeds. It was not until some years after the invention of the microscope that their real nature was understood.

Such terms as Blight, Mildew, Rust, and Smut are the popular names of diseases of plants caused by fungi. For the most part all diseases of plants not directly caused by insects are due to the attacks of fungi in some form or other. In general it can be said that all plants have their fungal parasites but in the case of wild plants they do little harm and pass unnoticed. A disease, however, that attacks cultivated plants quickly attracts attention.

With the development of intensive cultivation and the increase of the facilities for communication, the economic aspect of plant diseases has become more and more important. In the wild state most plants live in a state of equilibrium with their environment which includes many parasitic fungi. When a plant is removed from its natural habitat, or developed to meet the special needs of man, this state of equilibrium no longer exists and much of the natural resistance of the plant to disease breaks down. For this reason cultivated plants suffer more severely than wild ones and are subject to serious diseases and waves of epidemics. The losses resulting from these represent enormous sums of money. The Downy Mildew of the vine alone is responsible for a loss to the vine-growing countries of the world, running into millions of pounds annually. In Canada in 1916 Black Rust of wheat accounted for a loss of £35,000,000 in the Prairie Provinces alone. In the United States of America the estimated losses in their main crop for 1919 were a range of from 2 per cent to 50 per cent. In Ontario, Smut of cereals alone costs £1,000,000 annually. The annual loss in Australia amounts to 15 per cent of the total output or £7,000,000. Similar depredations are reported from other agricultural countries. With the great variety of crops grown in Cyprus, nearly all of which are subject to certain fungus diseases, the total annual loss must be very great. In Palestine, where conditions are similar to those of Cyprus the loss from wastage in Jaffa oranges from fruit rots amount to £50,000 per annum. It is the gradual realization of the extent of these losses that has led to the appointment of Plant Pathologists and the formation of a Plant Pathological Service in all civilized countries. In such a service it is the duty of the Mycologist to deal with all matters relating to fungi and the diseases caused by them.

---

* Abstracted from the *Agricultural Supplement* No. 42 to *The Cyprus Gazette* No. 2189, 24 December, 1931.

The chief duty of a Mycologist is to give advice on the control and prevention of fungus diseases. Every country has its own peculiar problems connected with disease control and a study of local conditions is necessary before advice can be given. In this connection the farmer himself can be of great assistance both in early notification of the appearance of the disease and by recounting the recent history of the crop. Fungus diseases are combated in a variety of ways; crops may be sprayed with fungicides consisting of compounds of copper, sulphur, and other chemicals; others may be more effectively controlled by dusting with certain powders. Any treatment must usually be first tried experimentally in every country before it can confidently be recommended to the grower for use. Much damage has been done and expense incurred by the indiscriminate application of fungicides. New products and new methods are continually being invented and experiments must be carried out in order that the grower can have the most efficient means of control at his disposal. Certain seed-borne diseases can only be attacked by treating the seed with dusts or solutions of chemicals. Recent advances in the science of disease control indicate that breeding for disease resistance plays an increasingly important part. The selection of strains and the testing of them experimentally are an important part of the duties of a mycologist.

A certain number of plant diseases can be recognized at sight but there are a great many, especially in a country whose possibilities have not yet been explored, about which little or nothing is known. Many diseases require a considerable amount of research and investigation before the causal organism can be identified and control measures prescribed. The chain in the life-history of the fungus must be known in order that it can be attacked at the weakest link. As an example of this may be quoted many of the rust fungi, a knowledge of the life-history of which enables control measures to be taken. Rust on pears, for instance, can be controlled by the eradication of the juniper and so on. Most fungi can only be recognized by their fruit bodies or definite stages in their life-history. It is to elucidate these points that an endeavour is made to reproduce the life-history of the pathogenic fungus in the laboratory. By means of a highly specialized technique the trained worker is able to separate out from the diseased tissue the fungus responsible in a pure form. This is then grown under artificial conditions and induced to form the various fruit bodies by which it can be recognized. This not infrequently necessitates study by a specialist in the group and comparison with a type specimen. It is only then that the mycologist can with certainty indicate the lines on which control measures can be taken.

Every country has peculiarities of climate, flora, etc., which necessitate a study on the spot of the local conditions and the parasitic fungi affecting the well-being of the agricultural and horticultural crops. Not only is a knowledge of the fungi attacking cultivated plants required but also of those which parasitise wild plants. It is one of the first needs of a Government mycologist to ascertain, as far as possible, what known diseases and fungi are already in existence. Records from direct observation, and from the reports of agricultural officers throughout the Island, are card indexed and the results summarised at the end of each year. In this way important information is obtained on the incidence of fungus diseases from year to year. In connection with the survey, herbarium specimens are prepared of all the fungi observed; this collection is made in duplicate in order that specimens may be compared with those at the Imperial Mycological Institute and at the Herbarium of the Royal Botanic Gardens at Kew.

It is a well-known fact that plants introduced into an alien country may lose their resistance to certain fungus diseases indigenous in their country of origin. Such introduced plants are liable to severe epidemics, should this parasite be introduecd at a later period. An example of this is seen in the Late Blight of potatoes which followed the introduction of the potato into Europe many years after it had become established there. In its native country in the Andes the potato is more or less resistant to attack by the fungus but, when with the advent of quicker transport it was able to survive the voyage, it caused an epidemic of unprecedented severity and caused widespread famine and distress. Similarly the parasite itself may acquire fresh vigour and virulence and play havoc with a plant not previously known to be susceptible. A fungus introduced accidentally into America from Japan attacked the sweet chestnut and rendered the cultivation of this tree in the Eastern States impossible, the damage done in seven years was estimated at £6,000,000. The coffee leaf disease completely wiped out coffee growing in Ceylon which was a flourishing industry in 1870. In many instances the accidental introduction of a parasitic fungus has led to epidemics of great economic importance. The danger is now generally realized and strict quarantine laws and inspection are in operation to enable the mycologist to prevent such a danger occurring.

Fungus diseases once established are extremely difficult to eradicate and constant inspection of crops by agricultural officers and the early notification of outbreaks of diseases are necessary to enable the mycological branch effectively to deal with fungus diseases before they are able to obtain a footing. In this respect the agricultural community can be of great assistance by seeking advice whenever they find their crops attacked.