

INTRODUCTORY NOTE ON VIRUS DISEASES OF PLANTS IN KENYA.

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A very large number of serious diseases affecting man, domestic animals, birds, insects and plants belong to the great group now known as Virus diseases. It is the object of the present note to mention the importance of virus diseases of local crops and to describe some of their characteristics, especially those that indicate interesting lines of observation that may be made in this country. Although a detailed study of one or more of the virus diseases is a work necessitating an elaborate apparatus and entailing many years of devoted work, yet there are a number of lines of observation, such as the insect fauna of plants, and the weed flora of plantations, which may immediately be made in this country and which should prove interesting and important.

A number of economic plants in Kenya are affected by one or more virus diseases. The mosaic disease of sugar cane is well known and has received attention, but there are present a number of other important diseases. These include the streak disease of maize, the mosaic disease of tobacco, the rosette disease of ground nuts, the curly-leaf disease of cassava, and a number of different diseases of the potato.

The causal agent of virus diseases, unlike that of diseases due to fungi and bacteria, has never been isolated or cultivated on artificial media. It is ultra-microscopic and is usually able to pass through a filter capable of retaining the smallest bacteria. As its causal agent cannot be cultivated on artificial media it is necessary to study a virus disease by its effect on the host. Virus diseases are infectious in varying degrees. Some are known to be so infectious that they may be conveyed in the field by mechanical inoculation during such a process of cultivation as pruning. The greater majority however are conveyed from diseased to healthy plants in the field by insects. In some cases one disease may be transmitted by several different species of insects, while often one species only is able to transmit the disease. In such a case where, though several species of insects feed in a similar manner on the plant, only one of them conveys the disease, it is possible that the virus may have to undergo some necessary change in the body of the insect and is dependent for this on some physiological peculiarity of the particular insect.

The mosaic disease of sugar cane has been shown by Brandes¹ to be transmitted by *Aphis maidis*; while Storey² has shown that the vector of streak disease of maize is the leaf-hopper *Cicadulina mbila*. Apparently this disease of maize is transmitted only by this insect and in no other way. It is interesting to notice that the vector occurs in

Kenya, and has also been found by Storey in the other East African territories.

Since the potato is an important crop in this country and is the host of a number of virus diseases, and further that several points of general interest in the study of these diseases are well exemplified in the potato, a short description of some of the potato diseases and their peculiarities will be given.

The most common is mosaic, the symptoms of which are a mottling of the leaves and a very slight puckering. In England this disease and a number of other potato virus diseases have been shown by Smith³ to be conveyed by the aphid *Myzus persicae*. The vector of these diseases in this country is not known, and in this connection a detailed study of the insect fauna of the potato plant would be of great interest.

The potato disease known as crinkle was first described by Murphy⁴. The plants are dwarfed, typically they are paler than healthy plants, and there is a pronounced puckering and downward curving of the leaves, usually with a marked mottling due to the presence of yellowish areas over the leaves. Another disease which though in certain varieties is similar in appearance to crinkle, is distinct in its reactions, was discovered by Dr. R. N. Salaman and the writer⁵. The reactions of this disease called para-crinkle will be described in some detail because several interesting general facts may be thereby introduced. It has already been remarked that virus diseases have to be studied by their effect on the host, and a difficulty of such studies becomes evident in this case where these different diseases crinkle and para-crinkle have almost identical symptoms in one potato variety, and on the other hand one disease para-crinkle has an entirely different effect on different varieties. Potato virus diseases are readily conveyed experimentally by grafting a portion of a diseased plant to a healthy one. Crinkle produces strongly-marked symptoms on President, Arran Victory, King Edward, Arran Chief and other varieties. Para-crinkle in Arran Victory and Arran Chief is a well-marked disease; but no symptoms whatever are produced in the varieties President and King Edward by grafting them with a scion diseased with para-crinkle. Nevertheless these plants although apparently healthy contain the pathogen of para-crinkle, and this can be shown by grafting a shoot from them to Arran Victory, which induces the disease with all its symptoms in this variety.

Varieties which contain the pathogen of a disease without showing any symptoms are known as "carriers." Such varieties are necessarily a danger to neighbouring susceptible varieties. This raises also another point of interest, which is that certain weeds have been shown to be carriers of virus diseases of economic plants. Thus in England the black nightshade *Solanum nigrum* has been shown by Smith⁶ to be an almost symptomless carrier of one or more potato virus diseases.

The potato can become infected with the disease by *Myzus persicae* feeding on it after feeding on the carrier weed. In this country there are a large number of solanaceous weeds any one of which might be a carrier of a potato virus disease. A study of such weeds would be of much interest.

Two other potato diseases are streak and leaf-roll. Streak shows its presence in the plant by the occurrence of streaks and lesions in the leaves and stem, and is often lethal, killing the plant completely in a few weeks. In leaf-roll the leaves are harsh and rolled and the whole plant is severely stunted. The yield of tubers is very reduced in plants suffering from this disease.

All the potato virus diseases mentioned occur in this country in which they cause a marked loss. As happens if potatoes are grown year after year from their own "seed" in the South of England so it appears to happen here, that the stocks gradually become increasingly severely affected with virus disease, their yield drops markedly, and frequent and constant re-importations of "seed" tubers are necessitated.

By growing stocks of potatoes known to be free from virus disease, as far as possible in isolation, attempts are now being made to maintain their health and high yielding qualities.

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