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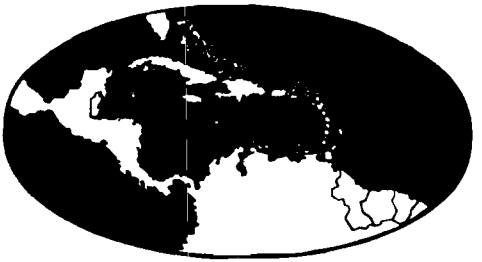

THIRTEENTH ANNUAL MEETING
ST. AUGUSTINE TRINIDAD, W. I.
JULY 6-12, 1975

PUBLISHED WITH THE COOPERATION
OF THE
UNIVERSITY OF PUERTO RICO
MAYAGUEZ CAMPUS
1980

VOLUME XIII

A PRELIMINARY STUDY OF A VIRUS DISEASE OF YAM FOLIAGE IN THE EASTERN CARIBBEAN

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SUMMARY

Preliminary studies on virus-like symptoms of yam foliage in the Eastern Caribbean are presented. Various symptom types affecting different species and cultivars are distinguished. Results indicate that only one virus or a group of closely related viruses belonging to the Potyvirus group are associated with the various symptom types. The extent of infection and its possible effects on yield are discussed.

INTRODUCTION

Virus-like symptoms affecting yam foliage have been reported from West Africa and the Caribbean within the past 40 years. Deighton (1936) reported a mosaic disease of yellow yam in Sierra Leone whilst a similar disease of *D. rotundata* was later reported from Nigeria (Anon, 1968). Studies on virus diseases of *Dioscorea* species in Puerto Rico were carried out by Adsuar (1955) on *D. rotundata* and by Ruppel *et al.* (1966) on *D. composita*. Harrison and Roberts (1973) reported a mosaic disease in yams imported from Barbados.

In the present study, a mosaic/mottle disease of yam foliage in the Eastern Caribbean is being investigated; this paper presents some preliminary results of this study.

RESULTS AND DISCUSSION

Five different species of yam are under investigation: *D. alata*, *D. cayenensis*, *D. esculenta*, *D. rotundata*, and *D. trifida*. Most of the work was carried out using *D. alata* cultivars as the project is located in Barbados and Trinidad where this species is most popular. Surveys of virus diseases of yams in various other islands (Jamaica, Dominica, St. Lucia, St. Vincent and Grenada) were carried out in 1974 and results of these are being published elsewhere.

Attempts were made to distinguish a number of different leaf symptoms:

1. Healthy (no leaf symptoms, leaves uniformly green).

2. Mild mottle (leaves with light, ill-defined areas of green and yellow-green).

3. Severe mottle (leaves with prominent but ill-defined areas of green and yellow).

4. Mosaic (leaves with well-defined patches of green and light-green).

5. Leaf distortion (puckering and deformation of leaves).

6. Vein banding (tissue around veins remaining green whilst interveinal areas turn yellow).

7. Vein clearing (chlorosis of veins causing them to stand out against the background of green).

Some of these symptom types were restricted to one or more cultivars or species; e.g. the mottling symptom was commonly found in *D. alata* cv. White Lisbon while vein-clearing appeared to be more common in the *D. alata* cvs. Oriental and Smooth Statia, *D. esculenta* and *D. trifida* leaves show a well-defined mosaic pattern in contrast to the rather ill-defined mottle of the *D. alata* cultivars.

Different symptoms were sometimes present on the same plant; for example, in the 1974 season, some White Lisbon plants growing at the University Field Station, Trinidad, had some leaves that were apparently healthy whilst others showed mottling (mild and severe), distortion or vein-banding on the same plant. There may even be a gradation of symptoms on one leaf during its lifetime - the newly emergent leaf may appear to be healthy at first but later on develops a mild mottle which becomes severe and then turns into a vein-banding symptom. Thus plants that have been labelled as showing mottling in the early part of the season are later on classed as showing vein-banding; other plants expressing a mild mottle initially may recover and later appear as being "healthy". This change in symptom expression could affect the results of surveys. Older plants may appear to be healthy because new growth may look healthy whilst the older leaves, which have become senescent, no longer show virus-like symptoms.

Preliminary electron microscopic examinations indicate the presence of a single virus, a long, flexous rod about 770 nm in length and found in very low concentrations. This virus is probably identical to the one reported by Harrison and Roberts (1973) and may be a Poty-

virus. Nearly 200 samples, from all five different species of yam in seven islands with all the different symptom types, have been examined and only one virus has been detected. This may mean that either one virus (with different strains) or a group of closely related viruses, indistinguishable by the present techniques, are associated with the virus-like symptoms in yam.

In order to determine the identity of the virus, attempts have been made to transmit it mechanically to other herbaceous hosts. Over 60 different plant species have been inoculated using a variety of buffers, reducing and chelating agents and proteins. All these attempts have failed, even when partially purified virus preparations were used. At present, experiments are in progress to attempt to transmit the virus using aphids since this virus is probably a Potyvirus and therefore is likely to be aphid transmitted (Edwardson, 1974). Lawson *et al.* (1973) were able to transmit a virus having a long, flexous particle from *D. floribunda* using *Myzus persicae*; Adsuar (1955) also transmitted a virus from *D. rotundata* using the cotton aphid.

These studies indicate that the virus is widespread in the Eastern Caribbean and it is possible that in some islands where yams are grown extensively e.g. Barbados, infection is nearly 100%. This is not always apparent from a casual visual examination of the leaves; plants which are apparently healthy have been shown to contain virus when a detailed electron microscopic study is carried out. Virus particles or structures associated with virus infection have been detected in apparently "healthy" plants. This widespread infection is probably due to the vegetative propagation of yams from tubers which would result in a build-up of virus in the planting material from year to year. It is very likely that all or most of the planting material in use in the West Indies at present is infected, albeit with only a low level of virus so that no viral symptoms are expressed. Man probably plays a key role in the dissemination of the disease, mainly through the use of cutting knives whilst spread by insect vectors in the field is also likely. This situation has close parallels to the infection of aroids in Florida by Dasheen mosaic virus as reported by Zettler *et al.* (1970).

One important point that should be brought out is the effect on yield of this virus disease. Although the level of infection may be 100%, the severity of disease on each individual plant is usually mild. Very rarely does one find plants that are badly stunted and show signs of severe infection. Usually the main part of the vine appears healthy with perhaps 20% (or even less) of the leaves showing virus symptoms. Therefore, the effect on yield would not be spectacular; experiments are in progress to estimate this potential loss in yield. But this does not

mean that the virus is unimportant; infection may build up over the years and under certain conditions the virus may become a problem. This appears to have occurred on at least one plantation in Barbados where disease incidence is high, infection is severe, plants are stunted and yield is obviously reduced. A possible temporary method of control would be to select out healthy looking plants every year for use as planting material in the next vear: this would tend to reduce the build-up of virus. Results of experiments carried out in Trinidad show that the build-up of infection in plants grown from healthy looking mother plants is slower than in those grown from severely infected mother plants.

At present, experiments are being carried out to determine the effect on yield of the leaf disease. Properties of the virus and methods of control are also being investigated.

ACKNOWLEDGEMENTS

We thank our colleagues in the Ministries of Agriculture in the islands visited for their help in carrying out our work. We are grateful toDrs. S.Q. Haque and R.H. Phelps for discussion and advice and to D. Gregg for technical assistance. Electron microscope facilities were provided by Dr. Ramon Lastra, IVIC, Caracas.

This project is financed by the ODA, United Kingdom.

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