Epidemiology of Yam mosaic virus : importance of aphid transmission.

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SUMMARY

Yam mosaic virus (YMV), a member of the Potyvirus group, causes a severe disease of yam, *Dioscorea* spp., mainly in Africa and the Carribean. There have been no data available hitherto on the quantitative effects of the disease on crop yield, due to difficulties in detecting the presence of the virus in the plant.

By using ELISA tests to identify healthy yam material prior to and after planting, reliable estimates of crop losses due to YMV were obtained through serial field trials over a three years period. Fresh tuber weights obtained from diseased *Dioscorea alata*, cv. Florido averaged 15% lower than those obtained from healthy plants grown under similar conditions. There was no difference however in the number of tubers formed.

Disease contamination by aphid vection during crop growth was found to be relatively slight compared to disease levels in the initial seed tubers. This suggests that selection of virus-free tubers could rapidly eradicate yam mosaic disease.

Yam mosaic disease is the major problem in yam cropping and the *D. cayenensis-rotundata* complex is particularly susceptible to it. The Phytovirology laboratory at Adiopodoumé (near Abidjan, in southern Ivory Coast), was amongst the first to identify and characterise the causal agent, Yam mosaic virus or YMV. It is a filamentous virus 750 nm in length, is aphid-borne in the non-persistent manner and is related to the Potyvirus group (Thouvenel & Fauquet, 1977, 1979). The virus has been purified and a specific antiserum prepared. As a result it was discovered that the area of distribution of the disease is very large and extends beyond Africa, for we have found diseased plants in the Carribean and in the Pacific (Thouvenel & Fauquet, 1986).

No other viruses or mycoplasmas have been identified from yam during 15 years of surveys in Ivory Coast, nor in neighbouring countries (Thouvenel & Fauquet, 1986).

Following the development of a diagnostic method for detecting the disease, based on immunoserological techniques, epidemiological studies were recently begun in Ivory Coast (Thouvenel & Fauquet, 1980, 1982). The initial results of this study are presented in this paper.

The cultivar used in these trials was *D. alata* cv. Florido, a variety widely grown in central Ivory Coast and considered to be tolerant to yam mosaic disease.

Evaluation of yield losses due to Yam Mosaic Virus

Experimental conditions : Seed-tubers were collected from plants subjected to ELISA test to determine sanitary state before harvest.

4 fields of 240 plants each were planted (12 rows of 20 plants) with healthy and infected seed-tubers, disposed in Fisher block where 1 block comprised 3 rows of 5 plants. Detection of YMV was achieved by an other ELISA test on the leaves during crop cycle.

1) Yield of presumed healthy and diseased plants based on ELISA tests before planting.

	Number of plants	Mean yield per plant (g)	Losses
Healthy	480	6150*	
Diseased	480	5350*	13%*

* *highly significant (P< 0.002).*

2) Yield of true healthy and diseased plants based on ELISA tests during cropping

	Number of plants	Mean yield per plant (g)	Losses
Healthy	550	6670 *	
Diseased	328	5630 *	15%*

* *highly significant (P< 0.001).*

It can be seen that diseased plants showed decreases in yields of about 15% (highly significant).

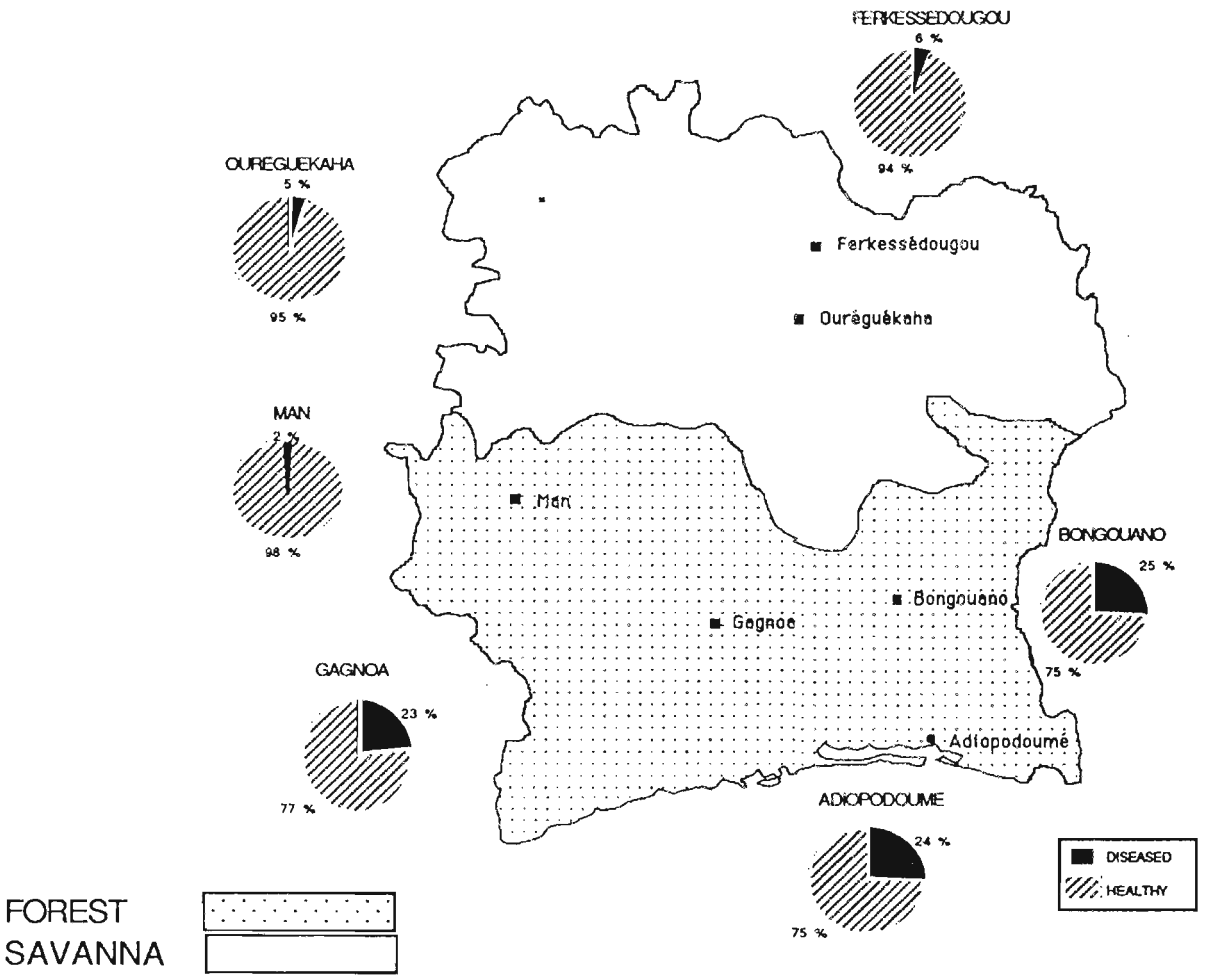
Based on the results of ELISA tests before planting and before harvest, it appears that 480 plants were presumed planted using healthy seed-tubers, but 550 healthy plants were found during crop cycle.

This fact seems to indicate that an infected seed-tuber can produce healthy plants. This point is further investigated in our laboratory. First results seems to confirm it.

This could be an important factor for the recovering of a healthy plant material from infected tubers. It would be a simple way of sanitation.

Epidemiological study of YMV in the Ivory Coast

Experimental conditions : Presence of the virus was determined by ELISA test on leaves before seed-tubers harvest. Fields of 120 healthy plants were planted in 6 different places of the Ivory Coast under usual local cropping conditions. After harvest tubers of each place were planted in pots under insect-proof greenhouses at Adiopodoumé and ELISA tests were performed on leaves.



The disease incidence is only attributable to insect vector contamination that range from 25% in south Ivory Coast to about 6% in savanna region (north). The presence of yam fields which could be a potential source of contamination near our trials, was not took in account during this study.

CONCLUSION

From the above results, the following conclusions may be drawn:

1) Yam mosaic disease may cause yield losses of 15% in *D. alata* cv. Florido despite the fact that this cultivar is considered to be tolerant to the disease.

2) Yam mosaic disease does not affect the whole number of tuber-seed pieces produced by a diseased tuber. This observation has implications for the selection of planting material.

3) Rates of transmission of the disease by aphid vectors seems very slow during crop growth in the savanna region ; determination of disease transmission in relation with insect vector will be very useful in the near future to choose the propagation sites for yam cropping.

Other experiments are now in progress to determine the effects of environmental conditions on the patterns of disease incidence and spread.

LITTERATURE

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