TEMPORAL PATTERN OF AFRICAN CASSAVA MOSAIC VIRUS SPREAD

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Disease development of virus diseases with time depends on many factors (2). Among those studied for African cassava mosaic virus (ACMV), a whitefly transmitted geminivirus, there are: the site and the date of planting, the clone used, and the situation in the field.

Factors influencing disease spread. The information below indicates that disease development with time is very variable.

	Site[a]			Position in field[b]			Clone[c]			Date of planting[d]		
	1	2	3	1	2	3	1	2	3	1	2	3
% Disease incidence	2	39	62	18	34	89	18	34	89	12	44	99

[a]Contrasting epidemics can develop in different sites, even among sites very close to one another. In site 1 (Toumodi, 200 km north of Abidjan) the level of contamination of healthy fields is much lower than at Tontonou (site 2) (a few km from Toumodi) and than at Adiopodoumé (20 km west of Abidjan, site 3) ("Development of ACMV at the regional level," same issue).

[b]Within a field, the disease spread varies according to the position in the field. In the center of a field (Position 1) and near the down-wind borders (Position 2) the infection is much lower than on the up-wind borders (Position 3) ("Spatial spread of ACMV", same issue).

[c]Clones showed a wide range of "field resistance" - a very low disease incidence was observed in clone 1(hybrid of *M. esculenta* and *M. glaziovii*) whereas high incidence was noticed in clones 2 and 3 (local clones) ("Multicomponent resistance of cassava to ACMV," same issue).

[d]Within a site, with a similar exposure and the same clone, ACMV spread is very dependent on the date of planting; it is low in October (1st), high in April (3rd) and moderate December (2nd).

Annual fluctuation of the inoculum pressure. From 1981 to 1986, an area of 0.1 ha of cassava was planted each month. Surveys were carried out each week, the disease incidence assessed, and the infected cassava uprooted. Inoculum pressure index was computed from the increase of disease incidence in cassava plots from the second to the third month. Whitefly populations were evaluated by weekly sampling and cassava foliage growth followed through leaf area index (LAI) between 60 and 90 days after planting. Detailed climatic data are available for the whole

period. Progress curves of ACMV contamination are different from one month to another and simple adjustments to the mathematical treatments available cannot be applied for each disease curve as a whole. Heavy infection, despite removal of the diseased plants, indicated that there is, over the year, influx of viruliferous whiteflies into the fields. This situation differs from that of Kenya where a low level of infection has been reported (1).

From the results obtained over 5 years there appears to be an annual fluctuation of every variable followed.

- inoculum pressure: high from March to July, low from August to November
- whitefly population: high from February to June, low from July to October
- cassava foliage growth: heavy from February to May, light from June to September
- temperature: highest from February to May, lowest from June to October

We analyzed the relationships between the virus, the vector, the plant and the climatic conditions of the environment (Fig. 1).

The close relationships between climatic conditions and infections allow predictions of the spread: 1) on the yearly scale, a rough prediction of high and low contamination periods ($r = 0.77$); 2) on a 2-month scale, a more accurate prediction based on the climatic area ($r = 0.98$).

REFERENCES

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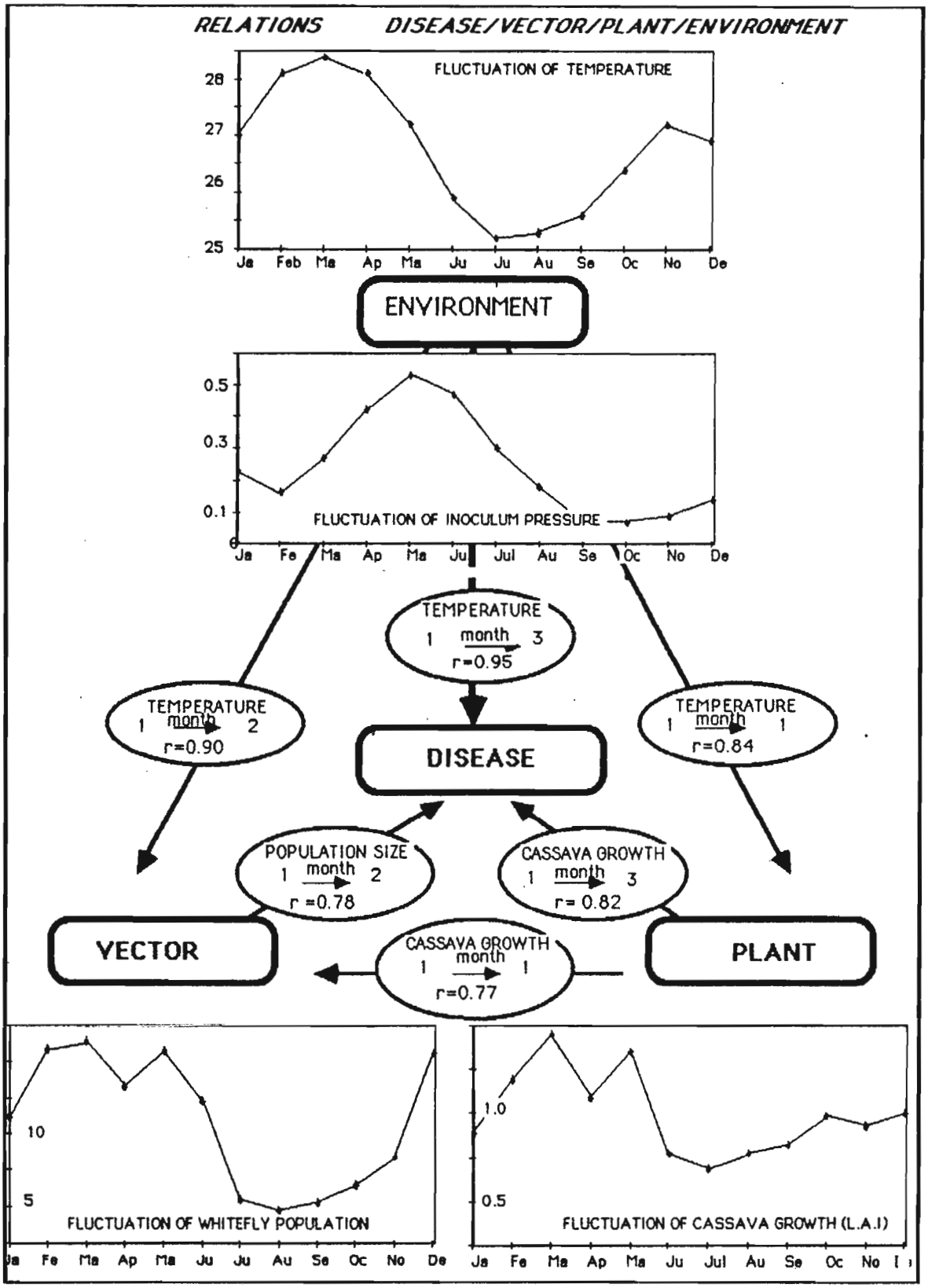

Fig. 1. Relationships between the annual fluctuations of the environmental conditions (temperature °C), the vector (number of whiteflies per plant), the plant growth (increase of the leaf area index), and the inoculation pressure (% of plants which became diseased). Coefficients of correlation and the optimal delay are indicated: for example, 1 ---> 2 indicates that the correlation is based on values of a month (1st) for the first variable with those of the following month (2nd) for the second variable.