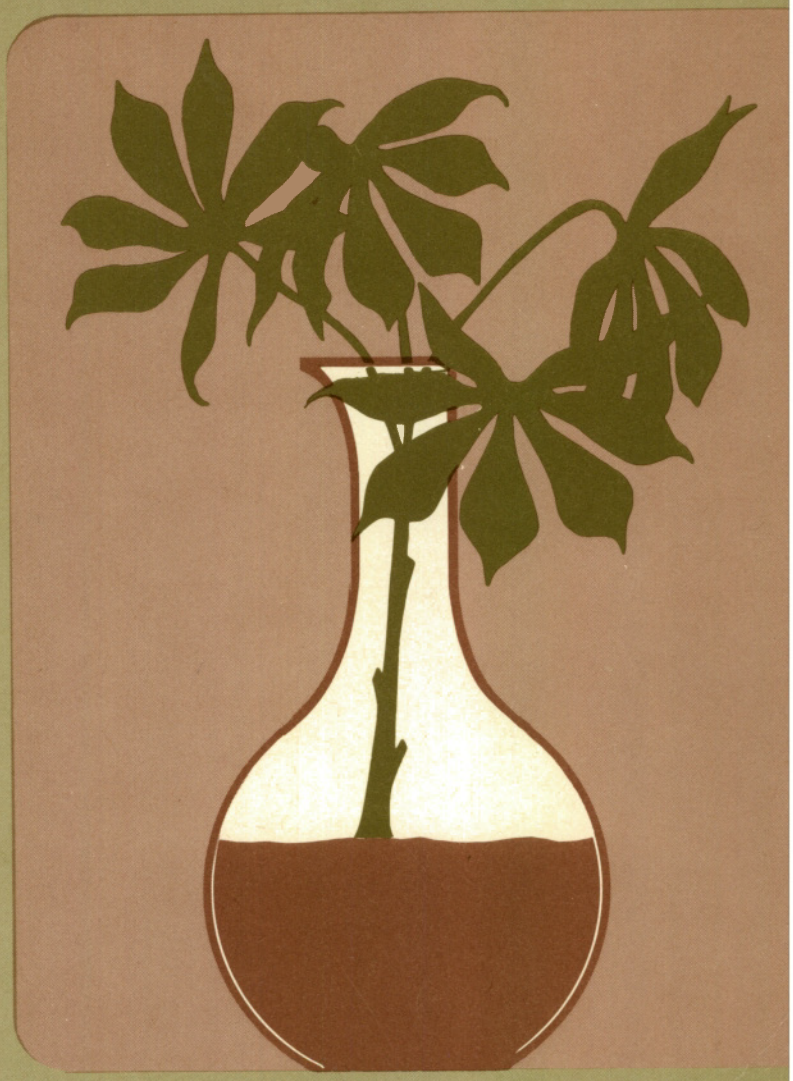
CASSAVA BACTERIAL BLIGHT

report of an
interdisciplinary workshop
held at
IITA, Ibadan, Nigeria,
1-4 November 1976.



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Editors:
Gabrielle Persley
Eugene R. Terry
Reginald MacIntyre

IDRC-096e

Postal Address: Box 8500, Ottawa, Canada K1G 3H9
Head Office: 60 Queen Street, Ottawa

Persley, G.
Terry, E.R.
MacIntyre, R.
IDRC IDRC-096e

Cassava bacterial blight: report of an interdisciplinary workshop held at IITA, Ibadan, Nigeria, 1–4 November 1976. Ottawa, IDRC, 1977. 36p.

/IDRC publication/. Report of a workshop on the /cassava/ /bacteria/l blight (CBB) /plant disease/ in /Africa south of Sahara/ — discusses the /diagnosis/ and /geographic distribution/ of CBB, influence of shade (/solar radiation/) and /intercropping/ on its incidence, /plant breeding/ for /disease resistance/; /disease control/ efforts in /Nigeria/, /Zaire/ and /Ghana/. Includes /bibliography/s, /list of participants/ and country statements from /Benin PR/, /Congo PR/, Ghana, and /Togo/.

UDC: 633.68 ISBN: 0-88936-143-6

Microfiche Edition $1

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Editors: **Gabrielle Persley, Eugene R. Terry, and Reginald MacIntyre**

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Control of Cassava Bacterial Blight in Zaire

H.C. Ezumah and K. Sebasigari

Programme national manioc, M'Vuazi, Gare-Mueke, Zaïre

Cassava bacterial blight (CBB) was first observed in the Gungu area of Bandundu Region of Zaire in 1970. Since then, it has been found in many parts of the country. Although the mode of dissemination cannot be traced accurately, several hypotheses may be made as to how it reached other regions. Lozano and Sequeira (1974) showed that the most efficient means of spread was by the use of infected cuttings. Infected clones are known to have been transferred to many areas in Zaire. Several manioc clones were reported to be resistant to CBB, including 02864, 02715, 0704/64, Masadisadi. At that time, the causal organism of CBB was reported to be *Pseudotheraptus devastans* (Dubois and Mostade 1973). Many reportedly tolerant clones have been transferred to some INERA (Institut national pour l'étude et la recherche agronomique) stations far from Gungi. Recent evaluations by PRONAM (Programme national manioc) staff and Maraite and Meyer (1975) have shown that these varieties are susceptible. Their movement may have contributed to CBB spread.

CBB and Vegetable Protein Supply in Zaire

Cassava leaves are widely used as a vegetable and protein source in Zaire, particularly in regions like Shaba and Kivu where the crop is grown mainly for its leaves. Damage by CBB has led to a shortage of leaves. The shortage became so acute in 1971 that fish farming was encouraged in Bandundu Region as a substitute for cassava leaf protein. However, this was not widely accepted.

The serious effects of CBB and other diseases and pests on vegetable protein supply occur because epidemics of CBB during the rainy season reduce leaf supply when new flushes and plentiful supply would normally be expected. Little or no leaves are retained by cassava during the dry season when CBB incidence is low and mealybug damage is severe.

Breeding Program

Since December 1974, attempts have been made by PRONAM and INERA staff to identify clones showing field resistance to CBB. Briefly, broad-based germ plasm is screened for disease resistance, and preliminary and advanced yield trials are then conducted at different locations, emphasizing areas with maximum disease pressure.

Germ Plasm Collection

PRONAM base population comprises several thousand seeds of wide genetic base from IITA, INERA stations, and farmers' fields as well as clonal selections from previous cassava improvement projects in Zaire. The materials were screened quantitatively for field resistance to CBB (Anonymous 1975) and other pests and diseases as well as for tuber shape and leaf retention.

Although the main source of materials is IITA, local seeds have been produced and established for screening. These are recombinants of IITA and local selections under (*a*) isolated conditions (partially controlled); (*b*) as polycrosses in open pollinated fields; and (*c*) as controlled crosses between promising local clones and IITA selections.

Although many of the selections from the IITA stock show field resistance or tolerance to CBB and other diseases, they are susceptible to mealybugs, which have become a serious pest. This problem is especially severe in Bas Zaire.

Fluctuations in CBB Incidence

CBB incidence varies with the season and from year to year, and is higher during the rainy season, because of more suitable environmental conditions for the survival and development of the causal organism *Xanthomonas manihotis* (Anonymous 1974; Lozano 1975; Terry 1975). The annual fluctuations may be related to the virulence of *X. manihotis* strains dominating from year to year. However, there is no evidence to support this hypothesis.

Multilocation Disease Evaluation

The strategy employed initially was to establish seedling nurseries at M'Vuazi, evaluate these, and to test selected clones in preliminary yield trials at several locations with varying ecological conditions (Ezumah et al. 1975). This strategy has now been modified by establishing seedling nurseries at selected locations. Seedling establishment is preferable because: (1) cost of transporting cuttings

Table 1. CBB scores on mean family bases (given as % in class) of seedling nurseries at three locations at 6 mo.

Location	I	II	III	IV	V[a]	Total
M'Vuazi	3	19	32	22	24	206
Lowe[b]	43	56	2	—	—	101
Vanga	11	23	19	28	19	150
Kigaka	—	No evidence of CBB			—	102

[a] Class I, resistant; class V, highly susceptible.
[b] Dry season: CBB incidence was low.

Table 2. CBB scores[a] from two locations in Zaire (given as % in class): Nkielelo (rich fallowed soil) and Boko (highly cropped derived savanna underlain by sandy soil).

	Clones from Nkielelo			Clones from Boko		
Source	I	II	Total	I	II	Total[b]
IITA						
Families	31.7	61.6	271	0.0	5.8	361
IITA-A	33.3	24.7	81	0.0	20.7	92
IITA-B	7.4	24.5	94	2.2	24.4	90
IITA-C	30.3	51.3	76	0.0	38.0	8
INTERA-D	26.2	26.2	84	0.9	5.7	105
Farmers	0.0	22.2	9	0.0	0.0	8
INERA-F	6.0	40.0	50	—	—	—

[a] Scores taken during rainy season, 1976.
[b] Total includes all clones in classes 1–5. Thus for Boko 94.2% were in class III, IV, and V.

is reduced; (2) the risk of introducing a pest such as mealybugs to other locations in Zaire is eliminated; and (3) heterozygous seeds provide wider genetic variability at each location. Results of CBB scores for four PRONAM nursery centres in Zaire are presented in Table 1. Selected clones will be carried forward to the preliminary yield trials phase next season.

Soil Effects

Results from two of several locations are used to illustrate the effects of relatively rich soil conditions at Nkielelo (derived savanna area fallowed for 5 yr before cropping with cassava) and poor soil conditions in the sandy Boko area where cassava is intensively cropped. Fewer cassava varieties were rated class I (resistant) at Boko than in Nkielelo (Table 2). The mean annual rainfall at Boko (1411 mm) and Nkielelo (1359 mm) are similar.

Conclusion

Efforts are being made by PRONAM to produce resistant cassava cultivars. Preliminary data suggest a correlation between the severity of CBB and soil fertility. Rapid screening under controlled conditions could increase the possibility of field resistance and reduce the number of clones established at multilocational sites. Evaluation of clones exposed to varying ecological conditions will continue to be emphasized.

Acknowledgments

We thank Mr P.H. Haynes, agronomist/project leader, and Dr R.P. Pacumbaba, plant pathologist, PRONAM, for their critical reading of the manuscript.

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