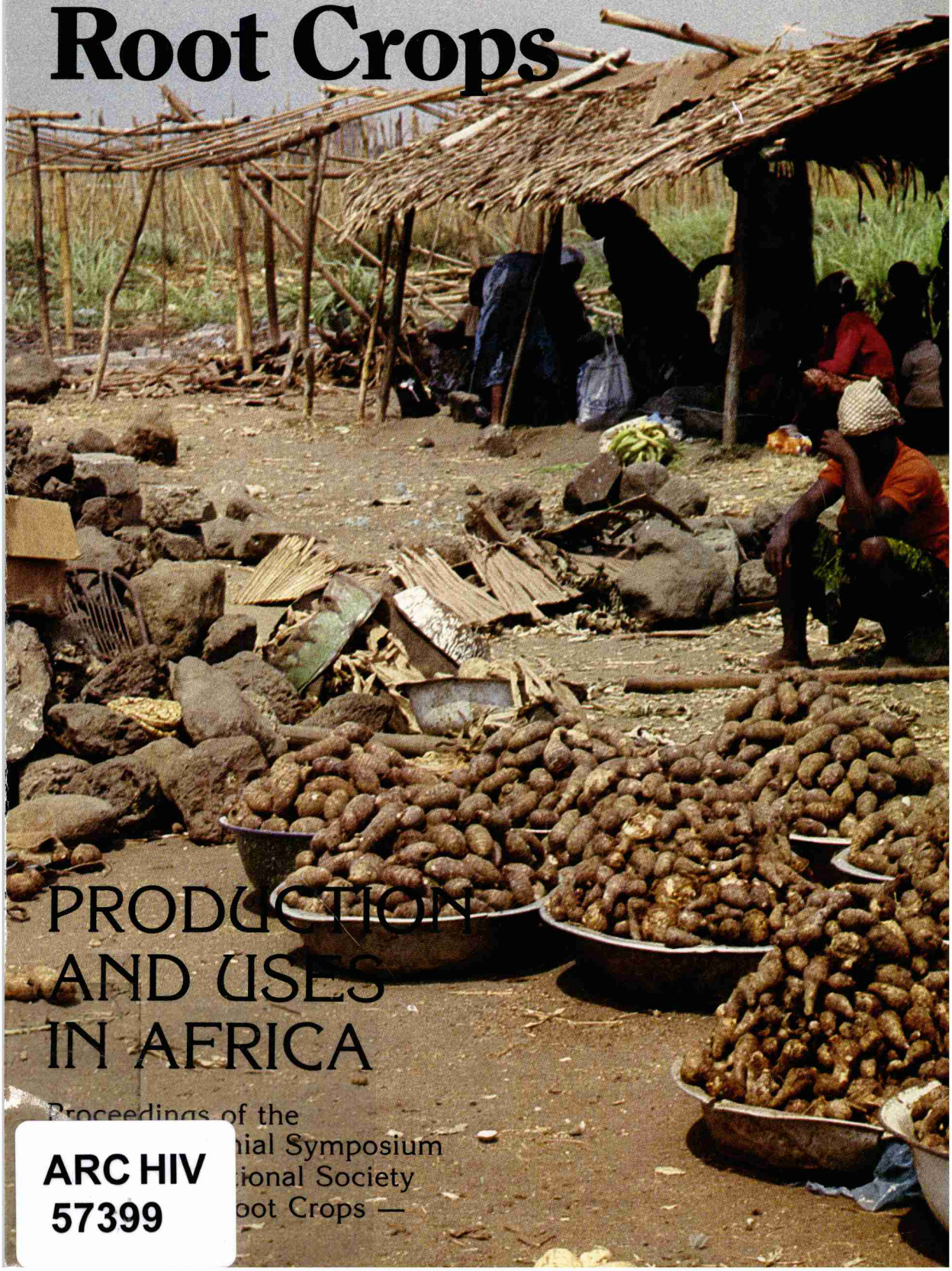
Tropical Root Crops



PRODUCTION AND USES IN AFRICA

Proceedings of the
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The International Society for Tropical Root Crops — Africa Branch was created in 1978 to stimulate research, production, and utilization of root and tuber crops in Africa and the adjacent islands. The activities include encouragement of training and extension, organization of workshops and symposia, exchange of genetic materials, and facilitation of contacts between personnel working with root and tuber crops. The Society's headquarters are at the International Institute of Tropical Agriculture in Ibadan, Nigeria, but its executive council comprises eminent root and tuber researchers from national programs throughout the continent.

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TROPICAL ROOT CROPS: PRODUCTION AND USES IN AFRICA

Abstract

A mixture of original research, updates on procedures, literature reviews, and survey reports, this document resulted from the second symposium of the International Society for Tropical Root Crops — Africa Branch, with 77 participants from 16 countries. The focus was cassava, yams, cocoyams, and sweet potatoes, from the perspectives of breeders, agronomists, soil specialists, plant pathologists, entomologists, nutritionists, food technologists, etc. Learning from past successes and failures, many of the researchers directed their efforts toward problems obstructing progress in reaching improved production and use of root crops and attempted to view, realistically, the context in which their results would be applied.

Résumé

Résultats de recherches récentes, mises à jour sur les méthodes de recherche, revues de publications et rapports de sondages sont contenus dans ce document issu du Deuxième symposium de la Société internationale pour les plantes-racines tropicales — Direction Afrique, qui a réuni 77 participants de 16 pays. Des communications sur le manioc, le taro, le yam et la patate douce ont été présentées par des phytosélectionneurs, des agronomes, des pédologues, des phytopathologistes, des entomologistes et des spécialistes de la nutrition et des aliments, entre autres. Tirant leçon de leurs succès et de leurs échecs, beaucoup de ces chercheurs ont dirigé leurs efforts vers la solution des problèmes qui entravent l'augmentation de la production et de la consommation des plantes-racines et ont tenté de considérer d'un œil réaliste le contexte qui sera celui de l'application de leurs recherches.

Resumen

Una mezcla de investigaciones originales, actualizaciones de procedimientos, reseñas de literatura e informes de encuestas, este documento es el resultado del segundo simposio de la Sociedad Internacional de Raíces Tropicales, Filial Africana, que contó con 77 participantes de 16 países. El simposio se centró en la yuca, el ñame, el cocoñame y las batatas, desde la perspectiva de los fitomejoradores, los agrónomos, los especialistas en suelos, los patólogos vegetales, los entomólogos, los nutricionistas, los tecnólogos alimenticios, etc. A partir de los éxitos y fracasos anteriores, muchos de los investigadores encaminaron sus esfuerzos hacia los problemas que obstaculizan el avance para lograr una producción y un uso mejorados de las raíces y trataron de obtener una visión realista del contexto en que los resultados pueden ser aplicados.

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TROPICAL ROOT CROPS:
PRODUCTION AND USES IN AFRICA

EDITORS: E.R. TERRY, E.V. DOKU, O.B. ARENE, AND N.M. MAHUNGU

PROCEEDINGS OF THE SECOND TRIENNIAL SYMPOSIUM OF THE INTERNATIONAL SOCIETY FOR TROPICAL ROOT CROPS — AFRICA BRANCH HELD IN DOUALA, CAMEROON, 14 – 19 AUGUST 1983

CONTENTS

SURVIVAL OF *BOTRYODIPLODIA THEOBROMAE* IN YAM TISSUES

B.I. ADERIYE AND S.K. OGUNDANA[1]

We investigated persistence of *Botryodiplodia theobromae*, a yam-rot pathogen, and found that the fungus survived in the stem for 6 months; in the tubers for more than 8 months, and in the leaves for only 3 months. It was also viable for at least 10 months in sterile soil samples inoculated with infected yam tuber pieces.

Although considerable interest has been shown in *Botryodiplodia theobromae*, little, if any, work has been done to show its continued existence after harvest. The fungus has been recorded as a storage-rot pathogen by others (Dade and Wright 1931; Okafor 1966; Adeniji 1970; Ogundana et al. 1970), but its survival after the crop's harvest has not been studied. We examined the continued presence of the yam pathogen from one cropping season to another in the various tissues of the host (*Dioscorea* spp.) including the leaf, stem, and tuber.

MATERIALS AND METHODS

Botryodiplodia theobromae was grown on potato dextrose agar (PDA) in aseptic conditions for 12 days at 25°C under continuous light (Ekundayo and Haskins 1969). A suspension of pycnidiospores from the 12-day-old culture was made with sterile, distilled water and filtered through nonabsorbing cotton wool, final concentration of the spore suspension being approximately 1.6×10^6/mL.

Leaves, stem cuttings, and tubers were washed with tap water, surface-sterilized with 95% alcohol, and rinsed three times with sterile distilled water. These tissues were then infested with the spore suspension and stored in sterile conditions.

At monthly intervals, 1 g of the infected tissues was comminuted in sterile distilled water, serially diluted (Anwar 1949), and plated onto PDA. The plates were incubated at 28°C until fungal colonies appeared and could be counted.

Several portions of infected yam tubers, leaves, and stems were placed in plastic-net bags (15 cm × 15 cm; 12 mesh/cm) (Nyvall and Kommedahl 1970). Bags containing fragments from each of the tissues were buried at three different soil depths (10, 30, and 60 cm) and examined monthly. The soil was examined periodically for the pathogen's presence.

Sterile and unsterile samples of two different soils were inoculated with 1-cm^3 pieces of infected yam tuber to serve as food bases (Turner 1960). At intervals, portions of the infected food base were weighed, comminuted, and plated on 10 mL molten PDA.

Table 1. Monthly sampling[a] of yam tissues for *Botryodiplodia theobromae* under laboratory conditions, 1982.

Sampling date	Fungal colonies ($\times 10^2$) in 1 g infected tissue[b]		
	Leaf	Stem	Tuber
24 February	35	46	50
24 March	26	34	42
21 April	9	28	38
19 May	0	24	32
16 June	0	12	28
14 July	0	6	20
11 August	0	0	16
8 September	0	0	10

[a]Each value is a mean of three replicates in each of the host tissues.

[b]Colonies were counted after 5 days of incubation in all samplings.

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Table 2. Fungal colonies[a] ($\times 10^2$) of *B. theobromae* obtained from finely comminuted food bases, 1982.

Soil type	Date of sampling (day/month)								
	24/2	24/3	21/4	19/5	16/6	14/7	11/8	8/9	6/10
Virgin									
Sterile	54	49	46	42	36	29	42	38	36
Unsterile	59	50	42	37	28	21	16	9	4
Farm									
Sterile	62	50	38	27	18	4	0	0	0
Unsterile	55	39	24	10	0	0	0	0	0

[a]Each value is a mean of three replicates.

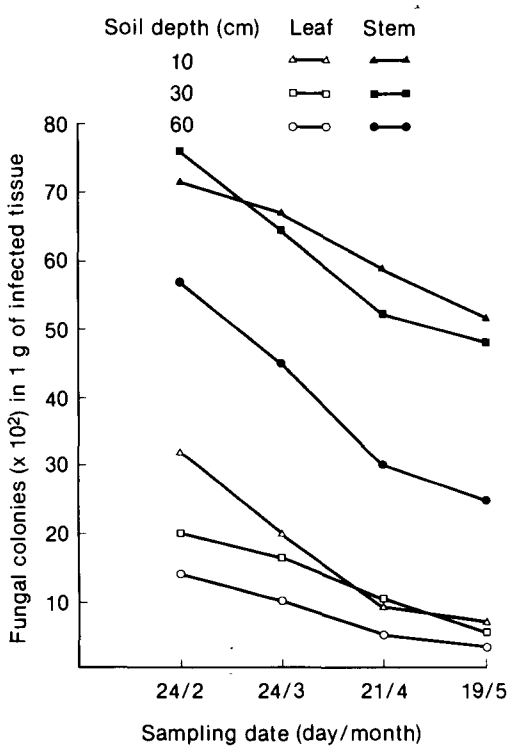

Fig. 1. *Fungal colonies surviving in yam tissues at different soil depths and sampling times.*

Results and Discussion

The fungus survived in the tuber for the whole 8 months of the experiment, in the stems for 6 months, and in the leaves for 3 months (Table 1). More colonies were obtained from the tuber than from the other yam tissues, the fungus being a tuber-rot pathogen. Its ability to degrade and utilize the carbohydrate of the tuber (Ogundana et al. 1971) may account for its longer survival in these tissues.

The study of the survival of *B. theobromae* in the buried tissues lasted only 4 months (24 February–19 May 1982) because the rains came early and altered the conditions of the experiment. However, the pathogen survived at the different soil depths for the full 4 months.

More isolates of the yam pathogen were obtained from the buried, infected stems than from the leaves at the different soil depths (Fig. 1). The fungal load at 10 and 30 cm in the infected stems beneath the soil was the highest throughout the period. The fungal count was low at 60 cm underground in both the stem and the leaf and decreased with time in both yam tissues. At 60 cm, the poor survival of *B. theobromae* may have been caused by competition from other fungal colonies (*Aspergillus*, *Fusarium*, and *Trichoderma*) that were isolated from the leaves (Hudson 1968).

Botryodiplodia theobromae in tuber pieces was more likely to survive in virgin than in farm soil (Table 2). In both sterile and unsterile virgin soil, the fungus survived throughout the 9 months of the experiment, although there were few colonies in the unsterile soil in the final 2 months. Survival of the fungus was shortest (4 months) in the unsterile farm soil and was only 6 months in the sterile farm soil.

The finding that *B. theobromae* survived 9 months in the yam tissues is similar to the results of Nyvall and Kommedahl (1970) who showed that *Fusarium moniliforme*, another yam-rot pathogen (Ogundana et al. 1970), survived in corn tissues for 8 months. In other words, the pathogen can tide over unfavourable periods on the host tissues for a period longer than normal yam storage in Nigeria (usually 7 months from October to early April).