

ACHIEVING YIELD STABILITY IN SWEET POTATO BY SELECTING
FOR TRANSLOCATION POTENTIAL IN ADVERSE ENVIRONMENTS

*(Parvenir à la stabilité du rendement chez la patate en sélectionnant
pour le potentiel de translocation des milieux adverses)*

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ZAIRE

SUMMARY

Due to large genotype by environment interactions, the sweet potato breeding programme in Burundi has been subdivided into four altitudinal regions. The corresponding test sites are viz. ; Imbo-Centre (830 m), Moso (1260 m), Mahwa (1835 m), and Kisozi (2090 m). In each test site an approximately same amount of seed from common genetic background was sown in nurseries and the seedlings were transplanted to the selection field. After two successive harvests with a selection of 10 per cent intensity each all selected clones from the four sites were grouped together and advanced into a multilocal preliminary yield trial, using the same sites, to which a swamp site, Murongwe (1470 m) was added. Unexpected results were recorded in view of the disruptive selection method used so far. Clones originally selected at Mahwa had greater yield potential and better environmental adaptability as a rule.

Two main reasons are put forward : (1) Mahwa combines low-elevation diseases (viroses) with high-elevation diseases (alternariosis) ; (2) although plant growth was vigorous and soil texture (heavy but rich in organic matter) appropriate for tuber enlargement, translocation conditions were adverse (low temperature, high humidity, and desaturated soils). Hence, stable clones are good "translocaters" combining wide disease tolerance.

RESUME

Le programme de sélection de la Patate au Burundi a été subdivisé en 4 régions altitudinales : Centre-Imbo (830 m), Moso (1260 m), Mahwa (1825 m) et Kisozi (2090 m). Dans chaque site on a mis en pépinière la même quantité de graines de même origine génétique, et les plantules ont été repiquées au champ. Une pression de sélection de 10 pour cent a été appliquée à chacune des deux cultures successives sur ces sites. Les clones alors retenus ont été regroupés et envoyés en essais multilocaux préliminaires de rendement sur la même série de localités. Les clones sélectionnés à Mahwa montrèrent dans l'ensemble la plus grande stabilité. (1) Mahwa associe des maladies de plaine (viroses) à des maladies d'altitude (alternariose) ; (2) bien que la croissance y était vigoureuse et la texture du sol (léger et riche en matière organique) adaptée au grossissement du tubercule, les conditions de translocation y étaient limitantes (faible température, forte humidité, sols désaturés). Ainsi, les clones stables se révèlent être de bons "translocateurs" combinant une large tolérance aux maladies.

INTRODUCTION

Sweet potato production has been found to be sink limited by HAHN (1977). JANSSENS (1984) however contented that sink limitation only occurs in fertile environments, and that source limitation is inherent to marginal environments, whilst translocation limitation is governing sweet potato production wherever environmental conditions are unbalanced.

Environmental exposure of newly created sweet potato clones can be done either at an early stage of a selection cycle (JANSSENS, 1982) or at a final stage (HAHN, 1982). In the sweet potato, population breeding has been proposed as an effective way of meeting specific breeding objectives (JONES, 1965), some of them coinciding with adaptation to a particular environmental niche (JANSSENS, 1982).

The present study investigates whether environmental stability may be linked to the translocation potential of the sweet potato.

MATERIAL AND METHODS

A multilocal preliminary yield trial, comparing 59 newly selected clones to three check varieties, was established in Burundi at the end of the 1984 rainy season. The five test sites were located at elevations ranging from 830 m to 2090 m and had widely varying pedologic and climatic conditions (Table 1). Within each site three randomized blocks were used, each sweet potato clone being allotted to a 1m² hill plot. Planting density was eight cuttings/m² i.e. three