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Performance of Selected Yellow Cassava Genotypes for Total Carotenoid Content and Yield Components in an Advance Yield Trial in 3 Environments in Nigeria

Akpotuzor P, T. O. Ogwuche, O. O. Aina, K.T. Olasupo, A. Ogungbesan, E. Fashoranti, A. Agbona, E. Y. Parkes and P. A. Kulakow

International Institute of Tropical Agriculture (IITA), P. M. B. 5320, Ibadan, Nigeria
Presenting Author email address: p.akpotuzor@cgiar.org

INTRODUCTION

Cassava *(Manihot esculenta* Crantz) is an important root crop widely cultivated in Nigeria and in Sub-Saharan Africa (Fig 1). Biofortified cassava clones provide an affordable source of Provitamin A in Africa and is used as an intervention crop to address hidden hunger resulting from vitamin A deficiency (VAD). It is therefore important to obtain information on the stability of total carotenoid concentration, yield and yield components of selected yellow flesh cassava under varying environmental conditions (Delacy *et al*., 1996; Yan *et al*., 2000; Yan and Rajcan, 2002).

OBJECTIVES

To evaluate the performance of selected yellow cassava genotypes for total carotenoids content and yield components

MATERIALS AND METHODS

Eighteen cassava genotypes with three checks were evaluated in an advanced yield trial in a randomized complete block design with three replications in three locations in Nigeria (Ibadan, Ikenne and Ubiaja) with varying climatic and soil conditions. Growth performance, reaction to pests and diseases were monitored periodically while yield related traits (fresh root weight, fresh yield, harvest index, dry matter content and total carotenoids content (TC) were determined at harvest, twelve months after planting (12MAP). Data generated were subjected to statistical analysis using proc GLM procedure in SAS for analysis of variance (ANOVA) and best linear unbiased prediction (BLUP).

RESULTS

Results showed highly significant effects ($p<0.01$) due to genotypes (G), environments (E), and G X E interaction for fresh yield (FYLD), dry matter (DM) and total carotenoids content (TC) by iCheck™. Genotype IBA130279 (9.74 t/ha) and IBA130807 (9.73 t/ha) recorded the highest dry yield (dyld). The highest TC was recorded by IBA130046 (12.5 µg/g fresh wt.), IBA130076 (12.3 µg/g fresh wt.) and IBA130799 (12.0 µg/g fresh wt. but with low dry yield of 3.22 t/ha, 4.54 t/ha and 4.97 t/ha, respectively. This resulted in a high negative correlation (r= -0.71) between clones means for dry yield and carotenoid content. However, some genotypes were identified to have high TC with high yield and reasonable DM such as IBA130044 (TC=9.1 µg/g fresh wt., dyld=7.07 t/ha) and IBA130078.

CONCLUSION

The study identified promising genotypes that could be advanced to the next breeding stage, while others with potential as parents for hybridization were also identified.

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Table 1: Analysis of Variance for cassava genotypes (t/ha) across 3 environments

Source of Variation	DF	TC Icheck	Fresh root yield	Dry matter content
GEN	17	67.02*	575.0*	212.90*
ENV	2	59.61*	5721.37*	278.44*
GE	34	4.12*	135.93*	19.10*
BLK(ENV)	6	4.25*$_3$	35.38*	27.62*
Error		1.97	65.25	9.82

Figure 1. Cassava field, harvested roots and diverse food products

Table 2. Best Linear Unbiased Prediction (BLUP) estimate of genotypes performance across 3 environments

s/n	Genotype	Cassava Mosaic Severity	Fresh Yield (t/ha)	Dry Matter (%)	Dry Yield (t/ha)	Total carotenoids content (µg/g Fresh weight)
1	IBA130279	1.0	28.8	33.8	9.74	3.9
2	IBA130807	1.0	30.0	32.5	9.73	8.3
3	IBA130265	1.0	29.8	30.5	9.11	3.4
4	IBA130329	1.0	25.6	34.6	8.85	5.3
5	IBA130266	1.0	21.4	38.6	8.26	3.5
6	IBA011797	1.2	28.7	27.7	7.95	3.3
7	IBA130044	1.1	25.2	28.1	7.07	9.1
8	IBA130078	1.1	24.7	28.6	7.07	9.9
9	IBA130089	1.1	25.1	27.1	6.78	8.9
10	IBA130210	1.1	25.9	23.1	5.97	9.6
11	IBA070539	1.0	23.1	22.9	5.29	10.7
12	IBA130799	1.0	22.5	22.1	4.97	12.0
13	IBA070593	1.1	17.9	25.7	4.61	10.5
14	IBA130076	1.1	16.8	27.0	4.54	12.3
15	IBA130049	1.0	14.7	22.5	3.30	10.6
16	IBA130046	1.0	14.4	22.3	3.22	12.5
17	IBA130332	1.0	12.2	25.7	3.14	6.9
18	IBA130422	1.1	11.4	19.6	2.23	9.9

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