



Direct planting versus transplanting of yam leaf-bud cuttings for seed production

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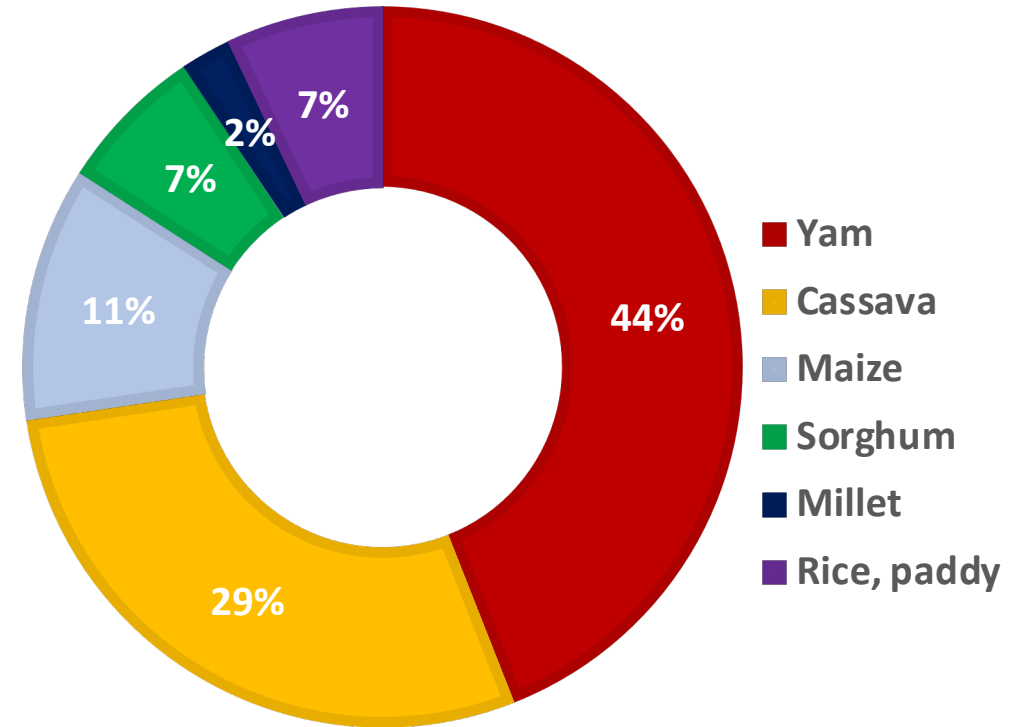
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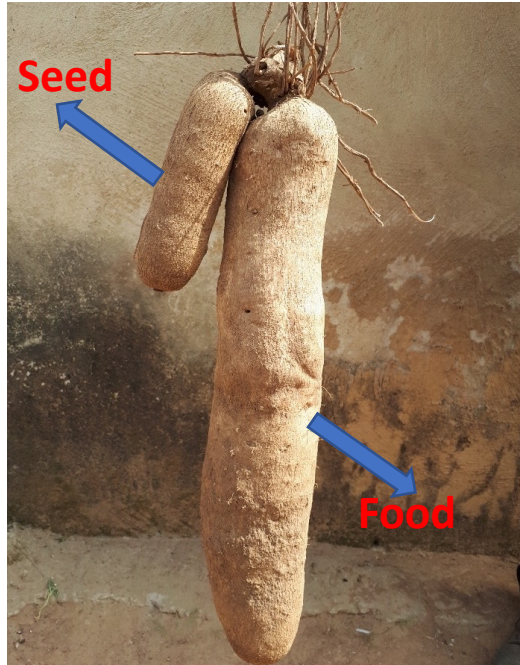
Introduction

- Five countries in West Africa (Nigeria, Ghana, Côte d'Ivoire, Benin, and Togo) produce more than 92% (67.9 M tonnes) of global yam.
- Nigeria has 70% of W. Africa's production (47.5 M tonnes).
- Yam is the most valuable staple in Nigeria with an annual production value of over US\$13.7 billion
- Its production is plagued with several seed related challenges.
- In traditional systems, yam multiplies slowly, seed is bulky, expensive, and has poor quality with low yields.



Crop production values in Nigeria (\$millions)
(2009 – 2018 FAO Stats.)

Major traditional methods of seed yam production



At harvest, tubers are sorted for use as seed (small tubers of up to 1 kg) and food (bigger tubers)



The same plant is harvested twice (milking). The first harvest is for food tubers and the second for seed tubers



Ware (food) tubers are cut into large sets of 250 – 500 g



Background to research

- Recent innovations in yam propagation use vine cuttings to produce seed tubers.
- Cuttings are rooted in a nursery or screenhouse then transplanted in the field.
- The rooting process delays field planting.
- In rainfed production, the growth period is extended beyond the rainy season necessitating irrigation.
- The suitability of planting leaf-bud cuttings (LBCs) direct in the field was assessed.

Materials and Methods



In the screenhouse:

- Virus-free minitubers of 3-5 g of two yam varieties, Asiedu and Kpamyo were planted in a substrate mix of topsoil and composted rice husk (1:1).
- Healthy mother plants were maintained by regular watering, fungicide and NPK fertilizer (15:15:15) applications.
- At 12 weeks after planting (WAP), vines from mother plants were cut and placed in clean water.
- Each LBC had 1 cm stem piece on either side of the node and one or two leaves.
- LBCs were placed in a broad-spectrum fungicide solution (Mancozeb 80%, 2 g/L of water).

Materials and methods

Preparation of field

- The field was tilled, made into beds, mulched with composted rice husk and shaded.

Direct-planted (DP) treatment

- LBCs were planted on beds at a spacing of 10 x 10 cm.
- Shade was removed at about 6 WAP (3 to 5 leaves).

Transplanted (TP) treatment

- Rooted LBCs were transplanted to the field 6 WAP.

Experimental Design

- 2 × 2 factorial in a randomized complete block with 3 replications

Data collection

Vegetative and yield data were collected and analyzed



Leaf-bud cuttings



Rooted leaf-bud cutting

Results and discussion

- Rooting started eight days after planting and shoots emerged began about 3 WAP for all treatments.
- There were no significant differences between the varieties for all parameters recorded
- The direct-planted LBCs was superior to those transplanted for all parameters (Table 1).
- The yield and mean tuber weight were 2.7 and 2 times, respectively, more for direct-planting.
- The root bound plants of transplanted LBCs were retarded in plant establishment in the field, resulting in lower tuber yield.



Fig. Transplanted plot and harvested tubers (left)
Direct-planted plot and harvested tubers (right)

Table 1: The effect of planting methods on the performance of two varieties of white yam planted

Treatment		% Field Establishment 8 WAP	Vine length (cm) 12 WAP	Leaf No. 12 WAP	LAI 12 WAP	Yield (t/ha)	Mean tuber weight (g)	Number of tubers/ha
Varieties	Asiedu	78.1a	132.6a	75.4a	3.2a	17.1a	37.3a	437,222a
	Kpamyo	76.6a	132.9a	73.1a	3.2a	18.2a	41.0a	426,667a
	LSD	5.3	13.56	6.36	0.63	3.66	8.36	35,339
Planting Method	DP	86.0a	155a	78.5a	3.8a	25.7a	52.6a	489,375a
	TP	68.7b	110.6b	70b	2.7b	9.5b	25.7b	374,514b
	LSD	5.3	13.56	6.36	0.63	3.66	8.36	35,339

Means with the same alphabet along the column are not significantly different at $p \leq 0.05$; WAP = Weeks after planting

Conclusion and recommendation

- LBCs can be rooted before transplanted or planted directly in the field.
- Direct planting yielded 2.7 times more than transplanting rooted cuttings.
- Direct planting of LBC is recommended for seed yam production.
- More research is needed to better understand the optimal agronomic requirements for seed yam production using LBCs



Field with direct-planted LBCs



Plants from direct-planted LBC 14 WAP

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