Recent Approaches to Seed Yam Production

Author: C. Oyolu, Department of Crop Science, University of Nigeria, Nsukka, Nigeria.

ABSTRACT

Continued production of yam as a crop depends on reducing the production cost. Cost reduction of seed yam, the popular propagule, is seen as a major contribution. Experiments to produce seed of white guinea yam (Dioscorea rotundata) using mini setts, herbicide and seed dressing have been conducted.

Cheaper and acceptable seed yam can be produced by the use of mini setts, herbicide and seed dressing. Appreciable reduction in the cost of producing ware yam is thereby affected.

Yams (Dioscorea spp.) have one of the highest production costs due primarily to high number of man-days required and cost of the propagule. The traditional propagule in yam production is the tuber. This may be in the form of seed yam, stump regrowth after detuberization or sett. Experience indicates that, all things being equal, higher tuber yields are obtained from larger propagules (Nwoke et al., 1973; Ferguson, 1973). Hence it is usual to use larger seed yams, stump regrowths or setts for the production of ware yams. It has been calculated that the propagule accounts for more than 50% of total production cost of ware yam (Oyolu, 1982).

Studies to establish cheap, rapidly multiplied propagules for yam production indicate that tubers are best. "Milking" (Okigbo and Ibe, 1973) and induction of plantlets sequentially carved out with about 10g segment of the parent tuber (Anon, 1975a) have shown some advantage over the traditional practice but have serious limitations. The minisett technique (Okoli, et al., 1982), a modification of the plantlet technique, appears to have the greatest potential for rapid multiplication of cheap seed yam. This report is part of research progress in the Department of Crop Science, University of Nigeria, Nsukka, Nigeria to find ways of reducing the production cost of yam. Research is supported by University of Nigeria Research Grants Committee.

Materials and Methods

One hectare field measuring 125x80 m was plowed, harrowed and worked into 125 ridges, 1 m apart and 80 m long.

Seed yams of D. rotundata c.v. nwopoko were cut into discs and each disc divided into four minisetts according to Okoli et al., (1982). In addition, ware yams of the same cultivar were also cut into discs some of which were divided into six minisetts and others into eight minisetts depending on the circumference of the disc. Weights of minisetts ranged from 18 - 32 g with a mean of 25 ± 3 g.

Aldrex T (a fungicide/insecticide) was applied by shaking about 30 minisetts in a large tin. The process proved slow, irksome, and uneconomical. Therefore, a seed dressing drum capable of taking 2,000 minisetts at one time was fabricated. As minisetts were loaded, aldrex T was sprinkled on minisetts layers. It took eight packets of 10 g each to dress 2,000 minisetts by rotating the drum for about 15 minutes.

The next morning dressed minisetts were sown at 25 cm spacing along the ridge, providing 40,000 per hectare. Sowing was on 18 June, 1982 about the time farmers in the area normally plant seed yam.

Pre-emergence spraying with gramoxone was done 4 days after sowing.

Sprouting began 21-28 days from sowing and by the 77th day, 82% of the minisetts had sprouted. As the minisetts sprouted, they were staked with slender Indian bamboo branches and the vines trained individually.

The ridges were manually remoulded and weeded between the 70th and 75th days from sowing and 450 kg of 15:15:15 plus 100 kg $MgSO_4$ applied immediately after remoulding ridges. The fertilizer was applied in furrows on both sides of the ridges.

Harvest was during the first week of December 1982. Tuber weights ranged from 75 g to 325 g with over 75% weighing between 195 g and 254 g (Table 1).

Table 1. Frequency of weights of seed yams produced from minisetts, 25 ± 3 g.

Class (g)	Frequency
75 - 86	137
87 - 98	319
99 - 110	376
111 - 122	482
123 - 134	407
135 - 146	512
147 - 158	335
159 - 170	519
171 - 182	614
183 - 194	568
195 - 206	2,989
207 - 218	8,205
219 - 230	7,437
231 - 242	2,942
243 - 254	4,010
255 - 266	1,121
267 - 278	779
279 - 290	395
291 - 302	364
303 - 314	213
315 - 326	76

Results and Discussion

Observations indicate that both seed yams and ware yams, of at least the cultivar studied, can be utilized as minisetts. Whereas 16-24 minisetts were obtained from seed yams, 48-80 were obtained from ware yams but the cost per minisett in either case was between ₦ 0.02 and ₦ 0.03. If it is possible to buy ware yam at less than three times the cost of seed yam, the former may be a better proposal as there is no difference in their performance.

Reproductive co-efficient of minisett averages abut 800 which is at least more than double the reproductive co-efficient of D. rotundata under traditional production (Oyolu, 1982).

Dependence of the new yam plant on the reserve nutrients for a considerable period and delayed functioning of leaves and roots (Njoku et al., 1973) appear to be modified in the minisett growth. It also appears that the normal positive correlation between the size of the propagule and the yield of individual plants in D. rotundata is altered. These require critical study in the minisett.

The minisett technique presents a rapid and cheap multiplication method for seed yams. Under proper care, it offers a chance to reduce the production cost of yam, especially Dioscorea rotundata.

Table 2. Cost of producing one hectare of seed yams from minisetts.

	Items				Cost (₦)†
(i)	6 Tractor hours				30.00
(ii)	Propagule*	No.	discs	minisetts	
	(a) Seed Yam	900	3,600	14,400	450.00
		500	3,000	12,000	250.00
	(b) Ware Yam	150	1,200	7,200	225.00
		80	800	6,400	120.00
(iii)	Cutting minisetts (8 man-days at ₦5.00)				40.00
(iv)	Dressing minisetts (1 man-day at ₦5)				5.00
(v)	160 packets of Aldrex T at ₦0.15				24.00
(vi)	9 liters gramoxone				90.00
(vii)	Application of herbicide (3 man-days at ₦8)				24.00
(viii)	Remoulding ridges and weeding (26 man-days at ₦5)				130.00
(ix)	550 kg fertilizer at ₦4.25 per 50 kg bag				46.75‡
(x)	Application of fertilizer at (16 man-days at ₦5)				80.00
(xi)	Stakes (100 at ₦2.50, usable twice)				500.00
(xii)	Staking and training vines (90 man-days at ₦5)				450.00
(xiii)	Harvesting (48 man-days at ₦5)				240.00
				TOTAL ₦	2,704.75

*
†Seed yams were bought at ₦0.5 each and ware yams at ₦1.50
(₦1) = U.S. $ 1.47
‡at 50% subsidy

Estimated profit may be calculated on 28,531 seed yams of 200 g and above which if sold at ₦0.13 per tuber gives ₦1,004.28 or just over 37% profit. This has not taken into account the 4,269 smaller tubers.

References

Anon. 1975a. Guide to rapid multiplication of yam tubers. Advisory Bulletin No. 2, Federal Agricultural Research Training Station, Umudike, Umuahia, Nigeria.

Ferguson, T.U. 1973. Tuber development in yams: physiological and agronomic implications. Proc. 3rd. Int. Symp. Root Crops, Ibadan, Nigeria.

Njoku, E., Oyolu, C., Okonkwo, S.N.C., and Nwoke, F.I.O. 1973. The pattern of growth and development in Dioscorea rotundata Poir, Proc. 3rd. Int. Symp. Root Crops, Ibadan, Nigeria.

Nwoke, F.I.O., Njoku, E., and Okonkwo, S.N.C. 1973. The effect of size of seed yams on yield of individual plants of Dioscorea rotundata. Proc. 3rd. Int. Symp. Root Crops, Ibadan, Nigeria.

Okigbo, B.N. and Ibe, D.G. 1973. A new method of yam propagation. Prov. 3rd. Int. Symp. Root Crops, Ibadan, Nigeria.

Okoli, O.O., Igbokwe, M.C., Ene, L.S.O., and Nwokoye, J.U. 1982. Rapid multiplication of yam by minisett technique. Research Bulletin No. 2 National Root Crops Research Institute, Umudike, Umuahia, Nigeria.

Oyolu, C. 1982. Inherent constraints to high productivity and low production cost in yam (Discorea spp.) with special reference to Dioscorea rotundata Poir. In Yams. Ignames. eds. Miege and Lyonga. Clarendon Press Oxford.