

Evaluation of Performance of new yam miniset sizes

ON-FARM EVALUATION OF THE PERFORMANCE OF NEW YAM MINISSET SIZES FOR INCREASED ADOPTION

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ABSTRACT

The mean adoption level and adoption index of the use of 25g miniset size for seed yam production are low (1.81 and 0.36, respectively) because it produces small seed yams which would not ultimately yield very fat yams. And so it could not meet most farmers' objectives in yam production. In order to expand the seed yam production objectives, more proven sett sizes were evaluated using farmer-managed on-farm research approach. Seed yams ranging from 200 to 400g were distributed to farmers who were assisted in cutting them into three sett sizes (25, 35 and 45g). Thirty farmers selected from two villages participated. The percentage establishment, total number of seed yams and total seed yam yield increased with increase in sett size. The smaller the sett size the greater the number of seed yams <500g and the greater the sett size the greater the number of seed yams > 500g. Based on the result of the fresh tuber yield, the number of seed yams > 500g and the stability analysis miniset sizes of 35g-45g are recommended for seed yam production

KEY WORDS: On-farm, evaluation, new, miniset, size, performance

INTRODUCTION

The scarcity and high cost of planting materials for yam (seed yams) constitute major constraints in yam production. Given a-1m x 1m spacing, 10,000 seed yams will be required to establish one hectare of ware yam farm. At the current average cost of N50 per seed yam of 200-300g, one would require N50,000 to plant up one hectare of yam. Prior to the introduction of yam miniset technique of 25g sett size, farmers used to provide their seed yam requirement by setting aside smaller tubers from their previous seasons' harvest (usually tubers in the range of 500-1,500g), cutting bigger seed yams into setts ranging from 80-100g and by milking.

Okoli *et al.*, (1982) developed the yam miniset technology for rapid and high volume seed yam production by the use of 25g sett size. This method has increased the multiplication ratio of seed yam from 1:1 or 1:4 to 1:30 and consequently reduced the cost of production.

This technology has spread across Nigerian borders to other parts of West, East and Central Africa and the West Indies (Orkwor and Asiedu 1998; Eke-Okoro *et al.*, 2006, Chinaka, 1999). In Nigeria, farmers have difficulty in adopting the technology of using 25g sett size though they recognize that it is an improvement on farmers practice (Iwueke *et al.*, 1990.) Part of their difficulty is the socio-cultural preference for very large ceremonial yams, which may not be produced by using 200-300g seed yams which are commonly produced from minisets of 25g. It has been repeatedly confirmed, under experimental conditions, that the greater the weight of the sett used to establish the yam plant, the greater the weight of seed tuber produced from the plant (Igbokwe *et al.*, 1982; Igbokwe, *et al.* 1983; Okoli and Opara, 1987; Eke-Okoro *et al.*, 2008). In view of the low adoption level of 1.81 (scoring scale of 1-5) and adoption index of 0.36 (Anuebunwa *et al.* 1998.) of this technology by farmers due to the resultant small sizes of seed yams, the National Root Crop Research Institute, Umudike (1997) modified the sett sizes to take into account the farmers' seed yam production goals in order to enhance adoption by farmers. This study was carried out to evaluate the performance of the modified yam miniset sizes of 35 and 45g against the earlier recommended sett size of 25g under the farmers' management system.

MATERIALS AND METHODS

The trial was conducted in 15 farms each from Ndikelionwu in Anambra state (between Longitude 6° 36' and 7° 21' E and Latitude 5° 38' and 6° 47' N) and Obibiezina in Imo state (between Longitude 6° 45' and 7° 30' E and

Latitude 4° 00' and 6° 00' N), Nigeria. The field lied fallow for two years (Ndikelionwu) and two and half years (Obibiezina) all after cassava/maize/egusi-melon intercrop. The trial involved 30 farmers. Each farmer prepared his plot according to the prevailing local practice which, generally, consisted of clearing, burning, packing and making of ridges for Ndikelionwu and flat (minimum tillage) for Obibiezina.

The treatments consisted of three sett sizes (25g, 35g and 45g) obtained from *Dioscorea rotundata cv. Obiaturugo*. Farmer management approach was adopted. Fifteen farmers, selected from each of the two villages, Ndikelionwu in Anambra State and Obibiezina in Imo State, were each given seed yams ranging from 200 to 400g. The farmers sectioned the seed yams, into 25, 35 and 45g under supervision. Each group of the cut setts was sorted into head, middle and tail regions. The setts were dressed with minisett dust (fungicide/insecticide mixture) and left to cure under shade overnight. The trial was laid out in a randomized complete block (RCB) design with fifteen replications. That is each farmer was used as a replication. The plot size was 6m x 5m. Planting was done in the second week of May in both villages. Each treatment group received equal number of head, middle and tail regions of the minisetts.

The minisetts were planted at 100cm x 25cm on the crest of the ridges. Cultural management such as weeding and staking were carried out according to farmers' practice. Compound fertilizer, NPK15:15:15 was applied at 400kg/ha (8bags) at eight weeks after planting (WAP).

The data on yields of the various yam sett sizes were analyzed using analysis of variance (Gomez and Gomes, 1983). Yields were compared using the least significant difference (LSD) at 5% of probability. Modified yield stability analysis (Hilderbrand and Poey, 1985) was used to compare the stability of the different minisett sizes across locations. This involves relating the seed yam yield of each minisett size to the environmental index by the simple regression equation $\hat{Y}_i = a + b$ where,

\hat{Y}_i = yield of variety i

a = constant

b = slope

e = environmental index, which is equal to the average yield of all the treatments at each location.

RESULTS AND DISCUSSION

Establishment

The percent establishment of the minisetts (Table 1) was significantly affected by the sett size, the percentage establishment being higher with larger sett sizes than smaller ones. For every 10g increase in sett size, there was a corresponding significant increase in the sprouting and establishment counts. Higher establishment (41.0%) was obtained in Ndikelionwu than Obibiezina.

Seed yam yield

Total yield of seed yam yield significantly increased with increase in sett size (Table 1). Seed yam yield from 35g and 45 g were not significantly different but were each significantly different from that of 25g. Higher seed yam yield was obtained in Ndikelionwu than Obibiezina by 12.3%.

Table 1: The Percent establishment and seed yam yield as affected by minisett sizes

Minisett size (g)	Establishment count (%)			Total seed yam yield (t/ha)		
	Ndikerionwu	Obibiezina	Mean	Ndikerionwu	Obibiezina	Mean
25	58.4	42.2	50.7	7.8	6.4	7.1
35	67.6	51.7	59.7	9.5	8.9	9.2
45	78.1	59.6	68.9	10.0	9.1	9.6
Mean	68.0	51.2	-	9.1	8.1	-
LSD 0.05			3.71			0.43

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Grading of seed yams

The total number of seed yams produced and their grading according to sizes are shown in Table 2. The number of seed yams produced increased with increase in sett size. More seed yams were produced in Obibiezina than Ndikerionwu probably due to differences in management by farmers, and soil factors. Table 2 also shows that greater number of seed yams < 500g were produced when 25g sett size was used, while greater number of seed yams $\geq 500g$ was produced from 35 and 45g setts. The responses of the total seed yam yield and the total number of the seed yams produced to miniset size are supported by earlier report of Igbokwe *et al.* (1982), Igbokwe *et al.* (1983), Okoro and Opara (1987) and Eke-Okoro *et al.* (2008) that the greater the size of planting material, the higher the seed yam yield.

Table 2: The total number of seed yams and seed yam grade as affected by yam miniset sizes

Total number of seed yams ($\times 10^3$)			%seed yam < 500g			% seed yams $\geq 500g$		
Ndikerionwu	Obibiezina	Mean	Ndikerionwu	Obibiezina	Mean	Ndikerionwu	Obibiezina	Mean
11.3	9.6	10.5	100	85.6	92.8	0.0	14.4	7.4
22.5	16.0	13.8	2.3	21.0	11.7	97.7	79.0	88.4
11.7	21.6	16.7	5.5	21.0	14.2	94.5	79.0	85.8

Modified yield stability analysis:

Figure 1 shows the response of the three miniset sizes to the environment. The R^2 values for the three miniset sizes were significant indicating a very good fit. It appears that all the sett sizes responded similarly to the environment. In good environment (those farms with yield $> 3.4t/ha$), all the sett sizes responded well, while in poor environment (farms with seed yam yield $< 3.4t/ha$), yields were poor irrespective of miniset sizes. Results also indicated that 45g sett size was consistently superior in both poor and good environments and therefore most stable. That is, stability of seed yam yields across environment decreased with decreasing sett size. These results are in agreement with earlier reports (Onwueme, 1973; Lyonga *et al.* 1973; Igbokwe *et al.*, 1982; Igbokwe *et al.*, 1983; Okoli *et al.*, 1982; Okoli and Opara 1987).

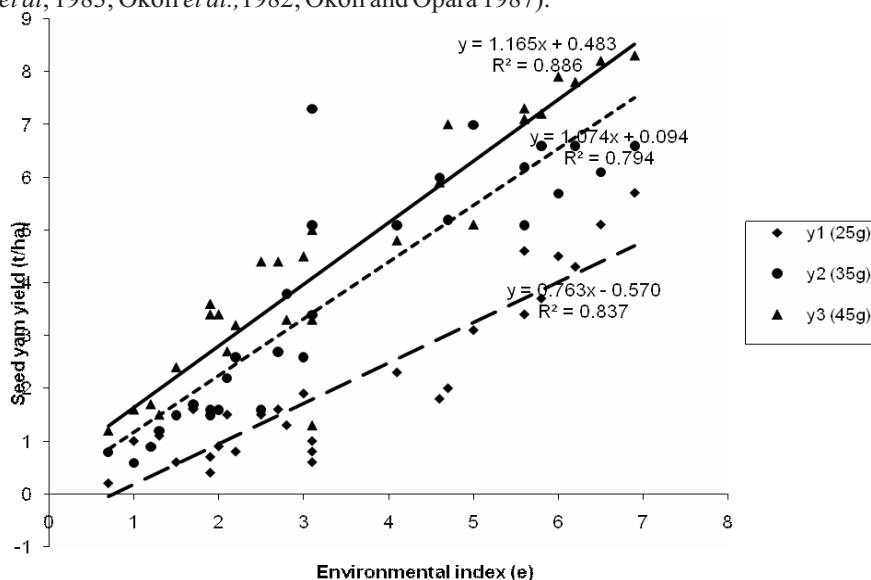


Figure 1: Response of different miniset sizes to environmental index

RECOMMENDATION

The yield and number of seed yams above 500g obtained from 35g and 45g sett sizes were not significantly different and their performances were stable across environments. Furthermore, most Nigerian farmers prefer seed yams above 500g in order to produce fat ware yams (4-5kg). At 40,000 minisett yam stands/ha, 2,857 seed yams of 500g would be required to establish it using 35g minisett size. This would be equivalent to N285,700.00 at N100.00 per 500g seed yam. However, Using 45g minisett size, 3,676 seed yams equivalent of N367,600.00, would be require for the same population of minisett stands/ha. A total of 819 extra seed yams valued at N81,900.00 are considered significant for the farmer. Therefore, this work recommends the use of minisett size of 35g for seed yam production. However, the recommendation of 25gsett size is still valid for farmers who want to produce seed yams below 500g.

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