Ginger (*Zingiber officinale* Rosc.) in South Eastern Nigeria. II. The field response of the uncoated ginger Yatsun-biri for rapid seed ginger production

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ABSTRACT

Sett weights (9, 7, 5 and 3 g) were assessed for rapid seed ginger (*Zingiber officinale*) multiplication at varying intra-rows (20, 15 and 10 cm) at two locations in South Eastern Nigeria. Establishment counts increased with larger setts but sowing off-sized setts (≈ 3 g) offers potential for rapid seed harvest and multiplication ratio. Close planting (10 cm within-row spacing) and larger setts produced significantly higher yields of rhizomes but not seed harvest multiplication ratio.

Key words : ginger, seed ginger multiplication, *Zingiber officinale.*

Introduction

The Nigerian ginger derives from two main cultivars viz., Taffin-giwa and Yatsun-biri. Yatsun-biri has a shrivelled appearance and presents a dull white colour. It emits a coarser essence than Taffin-giwa and though would be preferred in perfumery, some consumers relish the rather peppery taste. Aspects of yield response to varying sett weights, time of planting and age at harvest were presented earlier (Okwuowulu 1988; Okwuowulu *et al.* 1990). There is need to evolve a system of generating large quantity of seed ginger to meet commercial requirements. The *in vitro* rapid multiplication method (Nadguada *et al.* 1980; Balachandran, Bhat & Chandel 1990) is not widely applicable at the farmers level at present. The present study therefore outlines the use of minisett weights for rapid production of seed ginger.

Materials and methods

Storing of seed ginger

Prior to field planting, large ginger knobs, obtained from previous season's crops were stored in moist sawdust bedding in locally woven baskets as suggested by Okwuowulu & Nnodu (1988) until planting time.

Field cropping

The trials were conducted at two locations viz., Umudike (5°29'N, 7°33'E; 122 m altitude) and Bori (4°41'N, 7°21'E; 4m altitude) and seasons (1988 and 1989) using seed pieces weighing about 9, 7, 5 and 3 g. Composite soil samples collected from the site at random were also analysed for nutrients. The trials were laid in a Completely Randomised Block Design replicated three times, each plot measuring 2.4 m x 2 m. The setts were sown at approximately 5 cm depth at 20, 15 and 10 cm within row and 20 cm apart. The prevailing cultural management practices for commerical ginger production in South Eastern Nigeria (Okwuowulu 1988) were adopted. Satisfactory establishment was obtained at 3 months and the crop was harvested after 8 months and the seed harvest multiplication ratio was calculated. As germination and growth are affected by fluctutating temperatures (Evenson, Bryant & Asher 1978), meteorological data were also recorded to explain yield differences at crop harvest.

Results and discussion

Use of moist sawdust as storage bedding for ginger facilitated inspection of seed lots and enabled early sprouting, the main source of deterioration to become easily detected and nipped off from the storage baskets. Weight loss and rotting, the other sources of losses were minimal.

Paulose (1973) described soils for ginger which included clay loams, sandy clay loams and lateritic soils. The soil type in this study, sandy clay loam was adequate for growing ginger. The soil at Umudike is derived from sand stones and shales distinct from the deep, porous soils derived from shale deposit at Bori. Visual symptoms of nutrient deficiency or excess (Asher & Lee 1975) taken during crop growth revealed no abnormalities. The major nutrients (N and K) often lacking in most of the soils were in the range of medium to high values (Anonymous 1989). The nutrient amendment application of compound fertilizer NPK 15:15:15 was similar to typical fertilizer mix of 13:13:13 (Haynes, Partridge & Sivan 1973) adopted in Fiji.

Table 1. Influence of sett weights on establishment of ginger (1988)

Sett weight (g)	Location	
	Umudike	Bori
3	73.0	70.4
5	69.9	71.8
7	74.5	82.7
9	75.1	83.1
SE	7.03	6.47
CD at 5%	5.50	5.28

Values denote percentages
(A similar trend was observed during 1989)

A lower yield was obtained in Umudike probably because of lower organic carbon content (1.10 in Umudike and 2.94 in Bori). The higher relative value in Bori with high organic matter fraction confirmed that ginger requires high organic matter (Paulose 1973; Okwuowulu *et al.* 1990). The yield was related to vaying establishment counts (Table 1). This varied significantly with increasing sett sizes; lower values at small setts being due to lower rate of sprouting and survival of smaller setts within each study site. The differences in yield between seasons (Table 2) could probably be attributed to the effect of

Table 2. Yield of ginger as influenced by sett weight and intra-row spacing

Intra-row spacing (cm)	Bori				Umudike			
	Sett weight (g)				Sett weight (g)			
	9	7	5	3	9	7	5	3
				1988				
20	13.50	9.37	8.90	7.97	9.57	8.53	8.27	5.90
15	16.20	13.57	9.90	10.07	12.07	11.60	9.53	9.13
10	20.43	17.43	13.57	12.03	16.10	15.33	12.87	8.80
Mean	16.71	13.46	10.79	10.02	12.58	11.82	10.22	7.94
SE	1.57				1.43			
CD at 5%	4.59				4.18			
				1989				
20	10.00	8.67	5.97	4.43	10.50	4.80	5.40	2.60
15	11.53	9.03	6.30	6.20	12.73	7.50	6.90	5.07
10	11.90	11.90	8.63	7.47	19.33	12.15	9.30	6.77
Mean	11.14	9.71	6.97	6.03	14.19	8.28	7.20	4.81
SE	1.20				1.08			
CD at 5%	3.52				3.17			

Values denote fresh rhizome yield (t ha^{-1})

certain weather elements. For instance, rainfall and temperature were not markedly different but sunshine, level of sensible heat and radiation distribution contrasted sharply causing retarted growth during sprouting and early life in the second cropping. Evenson, Bryant & Asher (1978) suggested that fluctuating temperatures during crop growth may well be the important factor limiting ginger production in Australia. Our experience (Okwuowulu 1991) and this study showed that soil temperature which may become erratic during crop harvest at rhizome development zone is an important factor which controls the

Table 3. Influence of sett weights and within- row spacing on seed harvest multiplication rate (SHMR) in ginger

Within-row spacing (cm)	Bori				Umudike			
	Sett weight (g)				Sett weight (g)			
	9	7	5	3	9	7	5	3
			1988					
20	5	5	5	8	4	4	5	6
15	5	6	6	10	4	5	6	7
10	6	5	7	11	4	5	7	8
			1989					
20	3	3	3	5	4	4	4	5
15	4	4	4	6	4	3	4	4
10	4	5	5	6	3	4	3	5

ultimate physical yield of rhizomes. Closer planting (10 cm within - row spacing) gave a significant higher yield (Table 2) similar to the yield obtained by larger sett weights but contrasted with the seed harvest and multiplication ratio (Table 3).

The present study indicated that use of minisett pieces offers promise for rapid seed multiplication in ginger similar to reports in food yams (*Dioscorea* sp.) and cocoyams (*Colocasia* sp. and *Xanthosoma* sp.) (Okoli *et al.* 1982; Kalu 1989; Arene, Udealor & Mbanaso 1987). The advantage of the current finding is use of as low as 3 g seed pieces for ginger, contrasting with the normal minisett weight of 25 g in other tuber crops. This response of the uncoated ginger can be exploited for massive production of seed ginger for the growing industry.

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