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Agro-Nutritional Determinants of Some Garden Egg Varieties (*Solanium gilo* L.)

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Abstract: Agro-nutritional determinants of five garden egg varieties were evaluated in replicated trials for two years at Samaru, Nigeria. Sweet white, Round green and Large green performed significantly better than the rest varieties agronomically, while Purple, Sweet white and Gauta bello had good nutritional qualities. Sweet white, though late maturing and tall had significantly ($P<0.01$) higher number of branches, flowers, leaves, fruit per plant, good fruit set, yield, with high crude fibre and ash content, low ether, total solids and moderate crude protein should be considered for commercial production especially fresh produce market. Round green and Purple varieties should be further improved to meet market demand.

Key words: Garden egg, agronomic, nutritional, performance

Introduction

Garden egg also known as egg plant (*Solanium gilo* L) is believed to have originated from India in wild forms, while the secondary centres of diversity are China and other part of Southeast Asia (Tindall, 1986). Garden egg belongs to the family solanaceae that includes potato, tomato and pepper. It is a woody perennial herb commonly grown for its fruits in tropical and subtropical climate, and it grows as annual crop under temperate conditions especially in Southern Europe and Southern United States of America (Kochhar, 1986; Dupriez and Deleener, 1989).

In the tropics, garden egg is grown for local consumption in homestead gardens. In Nigeria they are widely grown in the northern part of the country; savannah agro-ecological zones. The fruits are eaten raw as vegetable, boiled, fried and at times stuffed before consumption (Martins, 1979; Rice, *et al.*, 1987 and Anna, 1991). The crop is grown mainly due to its prolific fruit production, quick maturation, rich source of vitamin A, B and C, phosphorus, calcium, magnesium, potassium and sodium which are essential in the prevention/treatment of bronchitis, dysuria and asthma (Purseglove, 1988; Kochhar, 1986; Dupriez and Deleener, 1989). The leaves, stem and roots provide grazing and fodder for livestock (Rehm and Espig, 1991).

Despite the beneficial use of this crop and its cosmopolitan nature, there is dearth of information about the agronomic performance, yield potential and nutritional content of the crop. The present study was conducted to generate information on the agro-nutritional determinants of garden egg varieties for further crop improvement.

Materials and Methods

The experiment was conducted using five garden egg varieties (Gauta bello, Large green, Purple, Round green and Sweet white). They were grown at the horticultural field of Institute for Agricultural Research (IAR), Samaru, Zaria latitude 11° 11'N, longitude 07° 38'E and altitude 686m above sea level during the wet cropping seasons of 1996 and 1997. Topsoil samples were analysed for physical and chemical properties using the procedures described by Black, (1965). The analysis revealed that the soil is loam with nutrient content of 0.04% and 0.05% N in 1996 and 1997 respectively. The pH was 5.3 and 5.5, C.E.C was 5.2, and 6.19 meg/100g soil, available phosphorus was 7.4 and 7.5 ppm and exchangeable acidity (H + Al) was 0.21 and 0.19 in 1996 and 1997 respectively.

The experimental design was randomzed block design with four (4) replication; the plot size was 12.0m^2 (4m x 3m). Each year, the site was ploughed; harrowed and flat beds were raised. Four seeds were planted per hole and later thinned to two seedlings per stand 2 weeks after planting. The seeds were sown on August 15, 1996 and August 18, 1997. Split application of NPK (15:15:15) fertilizer was made at the rate of 100kg/ha 3 and 6 weeks after planting each year. The crops were sprayed with Cymbush® and Benlate® to check insects and fungi attack, all other crop cultural and management practices were done as recommended by IAR, (1993) to raise a successful crop. Proximate analysis was done to determine moisture content (%), ether extract, ash, crude fibre, crude protein (%) and total solids (%) using appropriate AOAC method, (1980).

Agronomic data were collected on number of branches, number of flowers, fruit set, number of fruit per plant, number of leaves at 1st flowering, length of internodes at 1st flowering (cm), days to 50% flowering, plant height (m) and fruit yield (kg/ha). Nutritional data (moisture content, ash, ether, protein and total solids) were obtained. Data collected were analysed in accordance with Gomez and Gomez, (1984). Significantly different means were compare using Duncan's New Multiple Range Test (Duncan, 1965 and Obi, 1986).

Results

Information on the weather condition during the period of experiment is presented in Table 1. Generally all the garden egg varieties performed better in 1997 cropping season than 1996, this is expected due to better climatic condition. More rainfall was recorded in 1997 having mean annual increase of 20.3% compared with 1996 cropping season. Distribution and establishment of the rain was better in 1997, and this affected the relative humidity that was higher in 1997 than 1996. The difference in temperature between the two years was not much. The analysis of variance for the variety, year and year by variety were significant, among the agronomic traits but not significant for the nutritional traits, therefore the results of agronomic trait performance compared on individual year bases for each variety, and nutritional trait performance average across year are presented in this study. Garden egg variety sweet white had significantly higher number of branches, flowers, fruit per plant, fruit set and fruit yield than other varieties and it performed better in 1997 than 1996 cropping season (Table 2). Purple and Gauta bello recorded significantly lower number of branches (14 and 15 in 1996, 16 and 18 in 1997), number of flowers and yield components. The yields for both varieties are 8.8kg/ha and 11.1kg/ha in 1996, and 10.5kg/ha and 13.4kg/ha in 1997. Table 3 present mean values of some plant traits in garden egg at Samaru. Sweet white had highest number of leaves at 1st flowering, longest internodes length, longer days to 50% flowering and tallest plant (11 and 15, 1.1 cm and 1.3 cm, 6.3 and 67.1, 1.2m and 1.3m in 1996 and 1997, respectively). Purple and Gauta bello consistently performed least agronomically for both years.

Table 1: Meteorological data the period of experiments

Month	Rainfall (mm)	Temperature (°C)		Relative Humidity (%)	
		Min.	Max.	10a.m	4p.m
1996					
April	-	23.0	37.4	55.8	31.7
May	158.7	21.8	34.2	69.8	47.5
June	143.3	19.5	30.2	77.5	62.6
July	156.7	19.0	28.2	79.4	60.5
August	171.1	19.9	27.7	79.5	72.7
September	136.2	20.9	30.1	81.5	69.6
October	59.9	18.5	31.4	65.5	55.1
Mean	118.0	20.4	31.3	72.7	57.1
1997					
April	47.6	21.8	35.1	57.2	34.9
May	86.4	21.1	32.1	74.9	50.5
June	115.2	20.5	30.1	79.6	65.6
July	213.8	19.9	28.8	84.5	68.5
August	290.2	19.9	28.8	83.4	73.3
September	200.4	19.9	28.8	83.4	73.3
October	82.4	20.1	31.2	79.6	69.3
Mean	148.0	20.5	30.7	77.5	62.2

Source: Meteorological Unit, IAR, ABU, Zaria, Nigeria.

Table 2: Mean values of yield component in 5 garden egg varieties at Samaru (kg/ha)

Variety	No. of Branches		No. of Flowers		Fruit Set		No. of Fruit/Plt		Fruit yield (kg/ha)	
	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997
Gauta bello	15d	18d	29c	34c	62.1ab	63.6c	25.5	29.0c	11.1c	13.4c
Large green	20c	21c	48b	50b	64.3ab	65.1c	30.0	30.0c	14.0b	16.7b
Purple	14d	16e	26c	30c	59.4b	61.3d	20.9	31.3c	8.8d	10.5d
Round green	24b	27b	51b	53b	65.5a	68.1b	39.6	42.0b	17.3a	18.9a
Sweet white	26a	30a	55a	59a	67.1a	70.4a	46.2	49.6a	18.2a	19.4a
SE (±)	1.53	1.66	3.04	4.71	2.03	2.01	6.11	4.20	0.97	0.88

Table 3: Mean values of some plant traits in garden egg verities at Samaru

Variety	No. of Leaves At 1st flowering		Length of Internode at 1st flowering		Days to 50% at at 1st flowering		Plant height (m)	
	1996	1997	1996	1997	1996	1997	1996	1997
Gauta bello	8b	9c	0.7c	0.9d	59.2b	60.5d	0.9b	1.1c
Large green	10a	10c	0.9b	1.2b	60.7b	61.9c	1.0b	1.2b
Purple	8b	8cd	0.6d	0.8e	55.1c	58.9e	0.8bc	0.9d
Round green	9b	13b	0.9b	1.1c	62.8a	65.3b	1.2a	1.2b
Sweet white	11a	15a	1.1a	1.3a	63.4a	67.1a	1.2a	1.3a
SE (±)	1.12	1.31	0.05	0.03	1.04	1.01	0.01	0.06

Table 4: Proximate analysis of 5 garden egg varieties average over 2 years at Samaru

Variety	Moi. (%)	Ash	Ether	Protein (%)	Fiber (%)	T. Sol. (%)
Gauta bello	92.04±0.11	4.22±0.18	12.96±0.23	16.41±0.21	14.06±0.11	8.09±0.06
Large green	93.01±0.14	4.08±0.26	15.41±0.27	14.82±0.22	12.62±0.12	7.85±0.14
Purple	91.98±0.09	4.31±0.14	14.58±0.06	15.21±0.15	16.70±0.09	7.22±0.15
Round green	88.73±0.32	4.06±0.12	16.03±0.16	14.91±0.49	16.56±0.13	10.80±0.31
Sweet white	92.61±0.12	5.58±0.08	12.67±0.13	15.91±0.50	13.72±0.06	7.51±0.13

Proximate analysis of 5 garden egg varieties (Table 4) revealed highest crude protein in Gauta bello (16.41%), Sweet white (15.91%) and Purple (15.21%), high fibre content in Purple (16.70%). Round green (16.50%) and Gauta bello (14.06%). The analysis also gave total solids to be 10.80% in Round green 8.9% in Gauta bello and 7.85% in Large green. Sweet white, Purple and Gauta bello had the highest ash content of 5.58, 4.31 and 4.22 respectively; similarly, Large green, Sweet white and Gauta bello had more moisture than the other varieties (93.01%, 92.61% and 92.04% respectively).

Discussion

There was consistency in the trend of garden egg variety performance for the two years evaluation; therefore the environmental effect was mainly responsible for their differential agronomic performance.

The five garden egg varieties are better established with better performance and good yield in 1997 than 1996, this could be attributed to higher rainfall, near uniform distribution of the rains and good native soil fertility that lead into better crop performance and yield in 1997.

Sweet white, Round green and Large green in that order performed better than the others in term of high number of branches, flowers, leaves, fruit per plant, they also exhibited better fruit set and fruit yield. All these traits are positively (at times highly) associated with higher yield. These same varieties are late maturing and fairly tall. Purple and Gauta bello though low yielding are early maturing and short plants. Olasanta, (1988); Ehigiator, (1998) worked on garden egg, Denton and Adeniran, (1990); Adeniran *et al.,* (1997) worked on melon, Showemimo and Olarewaju, (2002) worked on pepper demonstrated the presence of genetic variation among lines of the vegetables. Therefore, the garden eggs in this study with high value of traits can be used for genetic studies and crop improvement programmes.

The high moisture content, ash content and low crude protein content of garden egg varieties is typical of fleshy vegetable and desirable to remain fresh for a longer period to meet market demand. High crude fibre, low ether and total solids is of interest in animal and human nutrition because it's helpful in avoiding diseases such as constipation, carcinoma of the colour and rectum, diverticulosis and atherosclerosis. The nutritional content of Purple and Gauta bello are outstanding though they are not exceptional in their agronomic performance, they could be improved via crop improvement programme Sweet white is exceptionally good from it's agro-nutritional performance. Similar result had been reported by Davidson *et al.,* (1975); Flick *et al.,* (1978) and Pushpanjali and Kochhar, (1995).

Conclusion

The results of this study confirms that among the garden egg varieties, the Sweet white variety is outstanding in agro-nutritional performance and should be considered for commercial production followed by Round green and Large green in term of agronomic performance only, while Purple and Gauta bello had good nutritional qualities. The variation in their agro-nutritional performance will enhance further improvement for desired traits.

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