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COMPARATIVE STUDIES ON THE NUTRIENT COMPOSITIONS OF FOUR VARIETIES OF EGG PLANT (*Solanum melongena*)

Chuku E. C., Agbagwa S. S., Chuku O. S. And Worlu C. W.

Department Of Plant Science And Biotechnology,

Rivers State University. Email: samuelagbagwa@gmail.com

Abstract

Study on the nutrient compositions of four varieties of garden egg (Solanum melongena) was carried out in the Department of Plant Science and Biotechnology, Rivers State University. The four varieties of garden egg assessed were Aubergine, local garden egg (Anara), yellow and green coloured garden eggs. Proximate composition analysis gave the following values for carbohydrate (8.05±0.011) and fibre (1.15±0.02) in the green garden egg variety, with the local garden egg recording the highest values for protein and lipid (1.5±0.001 and 0.35±0.013) respectively. Moisture value was highest in Aubergine (95.0±0.008). Analysis for mineral and vitamin contents of the various garden egg varieties revealed the presence of magnesium, calcium, potassium, iron, sodium and phosphorus. Vitamins A and C were also found in all the garden egg varieties. However, the yellow garden egg recorded the highest values for calcium, phosphorus, iron and vitamin A, with the highest amount of magnesium and sodium recorded in Aubergine (6.1±0.21) and (6.5±0.13) respectively. Phytochemical evaluation showed that the local garden egg variety had the highest contents of oxalate, carotenoid and polyphenol. Highest value for saponin (0.05±0.00) was observed for the green variety. However, green and local garden egg had equal values for phytate. Tannin was found in equal amount in the yellow and green varieties while local garden egg and the yellow variety recorded equal amount of flavonoid (0.05±0.001). In general, the nutrient composition of the different garden egg varieties varied from each other. From the for going, garden egg fruit should be incorporated into diets considering its high nutritional quality.

Key words: *Solanum melongena*, variety and nutrient composition

INTRODUCTION

Solanum melongena commonly known as eggplant or garden egg is a member of the Solanaceae family and could be found in so

many parts of the world (Sharmin, Khalil, Begum and Meah, 2011; Sifau, Ogunkanmi, Adekoya, Oboh and Ogundipe, 2004). Being a tropical perennial plant, it is cherished both as a vegetable and fruit (Agnieszka, Stainislaw and Kunicki, 2007). Garden egg attains a height of 40 to 150cm and may possess leaves that are coarsely lobed. The leaves are 5 to 10cm wide and 10 to 20cm long (Syfert, Castaneda-Alvauz, Khoury, Sarkinen, Sosa and Achicnoy, 2016).

Depending on the variety, fruits of *S. melongena* could be egg-shaped, purple and glossy. Although, others may be white in colour, fleshy, spongy and longer in shape (Vorontsova, Stern, Boh and Knapp, 2013). The variation serves as a source for several breeding programs leading to improved hybrid for better climatic adaptation, pest and disease resistance (Rotino, Sala and Toppino, 2014).

Eggplant is also appreciated for its nutritional composition as several researchers have shown it to be a good source of proximate, mineral and vitamin (Kamga, Kouame, Atangana, Chagomoka and Ndango, 2013; Agoreyo, Obana and Obanor, 2012). Food materials such as protein, fibre, carbohydrate, moisture and ash have been implicated to be present in *S. melongena* (Ayaz, Colak, Topuz, Tarkowski, Jaworek, Seiler and Inceer, 2015). More so, Chuku and Agbagwa (2018) further showed the occurrence of calcium, potassium, phosphorus, sodium, iron and magnesium in the fruit of garden eggplant. Other researchers have also revealed the occurrence of vitamins A and C in the fruits. In addition, appreciable amounts of phytochemicals such oxalate, saponin, tannin, polyphenol and flavonoid were also reported to be present in eggplant (Nwodo, Abayomi, Eboji, Opeyemi, Olajumoke and Damilola, 2011).

This nutritionally endowed plant is also faced with the challenge of pest and diseases. Several studies carried out have profiled the menace of different fungi such as *Aspergillus spp, Penicillium spp, Fusarium spp* and other bacterial organisms to cause spoilage of the fruits of S. *melongena* (Chuku, Chuku and Agbagwa, 2017). The activities of these organisms do not only affect their marketability but also the income of the farmers and traders (Jidda and Musa, 2016; Zacharia and Philip, 2010).

Nevertheless, there is little literature about the nutritional quality of the various varieties of eggplant found in Port Harcourt, Rivers State. It is on this basis that this research was carried out to assess the nutrient contents of four varieties of eggplant found in Port Harcourt.

MATERIALS AND METHODS

Sample Collection

Four varieties of eggplant (aubergine, local garden egg "anara", yellow and green) were obtained from Mile III Market, Port Harcourt. Samples bought were transported to the Department of Plant Science and Biotechnology, Rivers State University for further studies.

Nutrient Composition Studies

The determination of proximate, mineral, vitamin and anti-nutrient contents of the eggplants were done using the atomic absorption spectrophotometry methods earlier described by AOAC (2005). Data obtained were subjected to statistical

analysis using the Microsoft Excel version 2019 16.0.6742.2048.

RESULTS AND DISCUSSION

Table 1: Proximate composition of four varieties of eggplant (%)

Varieties	Moisture	Ash	Lipid	Carbohydrate	Protein	Fibre
Yellow	93.0 ±0.003	1.0±0.002	0.2±0.011	3.7±0.004	1.3±0.003	1.0±0.003
Green	88.5±0.001	1.0±0.010	0.3±0.024	8.05±0.011	1.2±0.013	1.15±0.02
Anara	89.0±0.001	0.9±0.002	0.35±0.013	7.40±0.002	1.5±0.001	1.0±0.004
Aubergine	95.0±0.008	0.5±0.022	0.12±0.041	1.4±0.003	1.4±0.003	0.93±0.005

Table 2: Mineral and compositions of four varieties of eggplant (mg/100g)

Varieties	Ca	K	Na	P	Fe	Mg	Vit. C	Vit. A
Yellow	14.0±0.004	3.5±0.012	5.1±0.005	4.9±0.005	4.0±0.003	5.0±0.002	21.1±0.003	121±0.001
Green	1.2±0.003	5.0±0.021	4.5±0.001	3.8±0.004	3.2±0.002	4.8±0.000	25.2±0.001	55±0.0.12
Anara	12.4±0.003	3.2±0.003	4.3±0.004	3.9±0.001	3.3±0.006	5.0±0.013	30.5±0.014	58±0.011
Aubergine	6.5±0.010	2.7±0.012	6.5±0.13	4.5±0.031	3.8±0.002	6.1±0.21	12.3±0.002	60±0.004

Table 3: Phytochemical composition of four varieties of eggplant (mg/100g)

Varieties	Phytate	Oxalate	Saponin	Tannin	Carotenoid	Polyphenol	Flavonoid
Yellow	0.02±0.00	0.01±0.002	0.03±0.001	0.1±0.001	0.01±0.003	0.01±0.002	0.05±0.001
Green	0.03±0.01	0.01±0.004	0.05±0.00	0.1±0.003	0.00±0.004	0.02±0.001	0.04±0.003
Anara	0.03±0.00	0.02±0.020	0.04±0.021	0.02±0.001	0.02±0.000	0.03±0.001	0.05±0.001
Aubergine	0.01±0.02	0.00±0.002	0.01±0.012	0.00±0.000	0.00±0.000	0.01±0.002	0.02±0.002

The result of proximate composition presented in Table 1, showed that local garden egg recorded highest values of lipid and protein while highest contents of carbohydrate (8.05±0.011) and fibre (1.15±0.02) were observed for the green variety. Aubergine had highest moisture concentration of 95.0±0.008. However, equal values of ash was recorded for both yellow and green varieties. The result of the present study are in line with earlier reports (Nwodo *et al*., 2011). Similar proximate values were reported by Ayaz *et al*., (2015). The fibre, protein and ash values in this study are lower than those reported in other leafy vegetables (Etong, Ayeni, Ajayi and Oladimeji, 2013). The importance of these assessed proximate parameters cannot be overlooked as they do not only support the provision of energy (carbohydrate) but also amino acids (protein) (Marten, Nilsen and Provan, 2017).

The results for mineral and vitamin as shown in Table 2, revealed the occurrence of calcium, potassium, phosphorus, sodium, iron, magnesium, vitamins A and C. Although, highest concentrations of calcium (14.0±0.004), phosphorus (4.9±0.005), iron (4.0±0.003) and vitamin A (121±0.001) were recorded for the yellow variety of eggplant. The highest values for potassium (5.0±0.021) and vitamin C (30.5±0.014) were observed in green and local anara varieties respectively. However, aubergine recorded highest concentrations of sodium (6.5±0.13) and magnesium (6.1±0.21). The mineral and vitamin parameters in this current study have been reported by early researchers in *S. melongena* (Kamga *et al*., 2013). The mineral and vitamin C recorded in this study are higher than those reported by Chuku and Agbagwa (2018), although they reported higher vitamin A value. Minerals and vitamins play vital roles in the general wellbeing of individuals as they support the immune system (Vit. C), proper vision (Vit. A), strong bone (Calcium), blood content (Iron) and other enzymatic and metabolic processes (Vance, Uhde-Stone and Allan, 2003; Waide, 1999).

Table 3 revealed the result of photochemical composition of eggplant and the results showed that the green variety had higher amount of saponin. Although, equal value of phytate was recorded for the local and green varieties. In addition, the local variety had highest concentrations of oxalate, polyphenol and carotenoid. However, equal

value of flavonoid was recorded for both yellow and the local varieties. Tannin recorded equal values for both green and yellow varieties. Several researches conducted by early researchers are in agreement with the phytochemicals recorded in this study to be present in eggplant (Agoreyo, 2012). Notwithstanding, early researchers have also shown the medical importance of these phytochemicals as they do not only serve as anti-inflammatory agents but also as anti-microbial agents (Sofowora, 1993; Nwodo *et al*., 2011).

CONCLUSION

The present study has further affirmed the nutritional quality of eggplant as it does not only possess proximate constituents but as well as vitamins and minerals. However, the occurrence of these nutritional components vary from the different garden egg varieties. Therefore, consumption of garden egg should be encouraged to support healthy living.

REFRENCES

Agnieszka, S., Stainislaw, C. and Kunicki, E. (2007). Cultivated eggplants-origin, breeding objectives and genetic resources, a review. *Annal of Folia Horticulture*, 19(1): 197-114.

Agoreyo, B. O., Obana, E. S. and Obanor, E. O. (2012). Nutritional and phytochemical analyses of varieties of *Solanum melongena*. *Sci. World J.*, 7(1): 23-42.

AOAC, (2005). *Official methods of analysis of AOAC international*. 18th edition. Association of official analytical chemists, Washington, D.C., USA.

Ayaz, F. A., Colak, N., Topuz M., Tarkowski, P., Jaworek, P., Seiler, G. and Inceer, H. (2015). Comparison of nutrient content in fruit of commercial cultivars of eggplant (*Solanum melongena* L.). *Polish J. of Food & Nutri. Sci.*, 65: 251-259.

Chuku, E. C. and Agbagwa, S. S. (2018). Shelf-Life preservation of some common fruits with crude extracts of *Vitellaria paradoxa*. *Nig. J. of Oil & Gas Technology*, 3(2): 304-310.

Chuku, E. C., Chuku, O. S. and Agbagwa, S. S. (2017). Antifungal potentials of butter extracts from *Vitellaria paradoxa* Gaernt. *Nig. J. Mycol*., 9: 105-114.

Etong, D. I., Ayeni, K. E., Ajayi, O. O. and Oladimeji, M. O. (2013). Physiochemical properties and nutritional value of Melina fruit and Mango seeds. *Int. J. of Chem. Sci*., 6(1): 56-62.

Jidda, M. B. and Musa, A. (2016). Fungal deterioration of eggplant (*Solanum melongena* L.) fruits in Maiduguri metropolis, Borno State, Nigeria. *Afri. J. of Basic & Appl. Sci.*, 8(6): 309-313.

Kamga, R. T., Kouame, C., Atangana, A. R., Chagomoka, T. andd Ndango, R. (2013). Nutritional evaluation of five African indigenous vegetables. *J. of Horticulture Res.*, 21: 99-106.

Marten, L. G., Nilsen, M. M. and Provan F. (2017). Pea hulfibre: Novel and sustainable fibre with important health and fractional properties. *E. C. Nutrition*, 10(4): 139-148.

Nwodo, S. C., Abayomi, C. O., Eboji, O. K., Opeyemi, C. E., Olajumoke, A. K. and Damilola, I. D. (2011). Proximate and phytochemical analysis of *Solanum aethiopicum* L. and *S. macrocarpon* L.

fruits. *Res. J. of Chem. Sci*., 1(3): 436-439.

Rotino, G. L., Sala, T. and Toppino, L. (2014). Eggplant: In *Alien gene transfer in crop plants*, 2nd eds Pratap et al. New York: Springer, 381-409.

Sharmin, D., Khalil, M. I., Begum, S. N. and Meah, M. B. (2011). Molecular characterization of eggplant crosses by using RAPD analysis. *Int. J. of Sustainability & Crop Production*, 16(1): 22-28.

Sifau, M. T., Ogunkanmi, L. A., Adekoya, K. O., Oboh, B. O. and Ogundipe, O. T. (2004). Partition and distribution of random amplified polymorphic DNA (RAPD) variation among eggplant Solanum L. in Southwest Nigerian. *Int. J. of Genetics & Mol. Biol.*, 6(1): 1-7.

Syfert, M. M., Castaneda-Alvauz, N. P., Khoury, C. K., Sarkinen, T., Sosa, C. C. and Achicnoy, H. A. (2016). Crop wild relatives of the brinjal eggplant (*Solanum melongena*): poorly represented in gene banks and many species at risk of extinction. *Ameri. J. Botany*, 103: 635-651.

Vance, C. P., Uhde-Stone, C. and Allan, D. L. (2003). Phosphorus acquisition and use: critical adaptations by plants for securing a nonrenewable resource. *New Phytologist*, 157: 432-449.

Vorontsova, M. S., Stern, S., Boh, L. and Knapp, S. (2013). African spiny Solanum subgenus Leptostemonum, Solanaceae: a thorny phylogenic tangle. *Botany J. Linnaeus Soc*., 173: 176-193.

Waide, R. B. (1999). The relationship between productivity and species richness. *Annual Review of Eco. & Systematics*, 30: 257-300.

Zacharia, R. M. and Philip, S. (2010). Biological control of postharvest disease of Brinjal. *Academic Review*, 17(182): 101-112

Flavonones in grapefruit, lemons and limes: a compilation and review of the data from the analytical literature. *J. Food Compost Anal.*, 19: 74-80.

Peter, A. (2015). Citrus fruits value chain development. *Nigeria J. of Bio., Agric. & Healthcare*, 5(4): 1-14.

Udeozo I. P., Okafor G.U., Ike O. C. & Eze E. C. (2018). The efficacy of Rhizophora racemosa wood: An important study. *Federal University Wukari Trends in Sci. & Tech. J*., 28:977-980.

Wright, J. (2004). *Flavour creation. Carol steam.* Allured Publishing Corp, pp247.