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Evaluation of Food Quality Attributes of Sweet Potato Leave and Scent Leave

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Abstract

This work investigated the evaluation of food quality attributes of sweet potato and scent leaves. The result of the phytochemical screenings revealed the following values for sweet potato leaves: Phenol 0.62 ± 0.01, the flavonoid 0.69 ± 0.31, saponins 0.19 ± 0.04, tannins 0.28 ± 0.01, alkaloids 0.33 ± 0.01, oxalate 0.14 ± 0.01, phytate 0.31 ± 0.01, HCN 25.9 ± 0.12 while for scent leaf phenol 0.87±0.01, flavonoid 0.89 ± 0.03, saponins 0.24 ± 0.02, tannins 0.20 ± 0.00, alkaloids 0.49 ± 00, oxalate 0.18 ± 0.01, phytate 0.26, HCN 6.1 ± 0.03. The proximate compositions for the sweet potato leaf were moisture 9.85 ± 0.03, protein 18.43 ± 0.20, fats 3.42 ± 0.02, fibre 11.2 ± 0.12, ash 0.85 ± 0.26, carbohydrate 48.20 ± 0.12 while for scent leaf, the proximate analysis includes moisture 9.66 ± 0.12, protein 9.69 ± 0.10, fat 4.41 ± 0.10, fibre 16.94 ± 0.1, ash 7.41 ± 0.20, carbohydrate 51.89 ± 0.61. The statistical analysis showed that there is no significant difference at P>0.05 between the sweet potato and scent leaves in the quantitative phytochemical screening while there was a significant difference between the sweet potato and scent leaves mean values in the proximate and vitamin screening at P>0.05. Therefore, this work recommends that the consumption of the two leafy vegetables should be promoted in our daily menu as this will help to improve our healthy living.

Keywords: Evaluation; Food quality; Attributes; Scent leave

Introduction

Recently, the intake of fruits and vegetables with high polyphenolic and high oxidant content are been encouraged because nutrients are best absorbed and used by the body when they are derived from natural source (plants and animals) [1]. These are present in naturally occurring complex compounds and not as separate compounds as formulated in pills [2].

Vegetables are edible parts of the plant which are usually cooked and salted before consumption with other foods [3]. There are thousands of plants used as vegetables [4]. They may be cultivated or wild, may be trees, shrubs, herbs, climbers or erect plant that cut across the plant kingdom [4].

Green leafy vegetables occupy an important place among the food crops as they provide adequate amount of many protein, vitamins and minerals like calcium, iron and phosphorus [5]. They are needed in food as well asroughage which promote digestion and prevent constipation [6]. Green leafy vegetables constitute an indispensable constituent of human diet in Africa generally and West Africa in particular [7].

Ipoema batatas is a tuberous-rooted perennial mainly grown as an annual crop [8]. The roots are adventurous, some of the roots produce elongated starchy tubers [9]. Sweet potato leaves have appreciable amounts of B-carotene [10]. The leaves are green or purplish, cordate, palmately veined. *Ipoema batatas* leafs have been proven to be an excellent source of anti-oxidative polyphenolics compared to other commercial vegetables, although has generally been an underexploited green vegetable [11]. Sweet potato leaves are used as vegetables for cooking [12]. The tuber is also fried and eaten as food. Sweet potatoes can be used fresh, dried or ensiled. Like cereal grains, sweet potato root is rich in highly digestible starch and sugar and as such used a vital component of feed for ruminant [13]. Besides being used for human consumption, the leaves serve as fodder and browse for cattle, sheep, goats, pigs and other domestic animals [14].

Scent leaf (*Ocimum gratissimum*) is generally referred to as basil, it is highly fragrant plant whose leaves are used as a seasoning herb for many different types of food Makri, and Kintzios 2008. There are more than 60 varieties [15]. It is a common plant grown and used in many countries of the world. It is grown in home gardens all over Nigeria, hence most ethnic groups have a name for it [16]. The Igbos call it “Ncha-anwu” or “Nchanwu”, the yorubas “efinrin”, the Hausas, daitadoya”, “ufuo-yibo” by the urhobos “esewon” by the Edos (WHF, 2005) [17]. *O. gratissimum* is a very good source of vitamin A and C [18]. In addition, it is a good source of dietary fiber and manganese. It also emerged from our food ranking system as a good source of iron and calcium and a good source of potassium [19].

It is in common use because it is believed to have therapeutic properties. Both the leaf and whole herb are popularly used for treatment of diarrhea [20].

Materials and Methods

To evaluate the food quality attributes of sweet potato leaves and scent leaf [21].The test plant leaves (*Ocimum gra issimum* and *Ipomeas batatas*) were collected from experimental farm of National Research Institute, UmudikeNRCRI) and identified by a plant pathology lab of NRCRI [22].

Sample preparation

Prior to chemical analysis, the test plant leaves samples were first washed with running water to remove soil and dirt [23]. They were allowed to drain, dried before it was cut into thin pieces and then spread on laboratory tray in which it was dried enough for grinding (24-48 hours) [24]. The dried sample was ground into powered form in a laboratory mill [25]. The obtained processed sample (ground sample) was put in a screw capped sample bottle and subsequently used for tests, and analysis [26].

Phytochemical screening

Qualitative analyzes was carried out to ascertain the presence of the different phytochemicals in the leaves before quantitative analysis was carried out [27].

Qualitative analysis of phytochemicals

Test for saponin, alkaloids, anthocyanins and flavonoids were determined by method as described, steroid was determined by the method described Phenols and Tannin were determined by follins method described while cyanogenic glycoside (HCN) was determined by alkaline picrate colourimetric method described [28].

Proximate analysis

The proximate composition was determined by the method [29].

Determination of minerals

The mineral content of the samples was determined by the dry ash acid extract ion method [30].

Calcium and magnesium content of the samples extracted was carried out by versanate EDTA complexiometric titration [31]. Flame photometry was used to determine the concentration of potassium and sodium as described [32].

Vitamins content determination

Determination of Vitc, was done by Barakat titrimetric method as described, while vitamin B1. B2 and Niacin were all determined by method as described [33].

Results

It shows the phytochemical composition of sweet potato leaves and scent leaves [34]. The values for hydrogen cyanide show that sweet potato had the highest value (25.9 ± 0.12) while scent leaves had the lowest value (6.1 ± 0.03). However, the result indicates that the sweet potato leaf and scent leaf mean values are not significantly different at P>0.05 [35]. It shows the proximate composition of the leaves samples wile shows the mineral content of the sweet potato and scent leaves samples [36]. From the result of the proximate compositions of the samples, scent leaf had the highest value for carbohydrate (51.89 ± 0.61) while sweet potato leaf had the lowest value for carbohydrate (48.20 ± 0.12) [37]. Sweet potato had the highest value for phosphorus in the mineral composition (316.77 ± 2.70) and scent leaf had the highest value for phosphorus in the mineral composition (261.52 ± 0.46) as revealed [38]. The sweet potato leaf and scent leaf mean values are significantly different at P>0.05 [39]. The vitamins content of the samples is shown in with both samples indicated to rich in vitamin C **(Tables 1-4)** [40].

Samples	Phenol	Flavonoid	Saponins	Tannins	Alkaloids	Oxalate	Phytate	Hydrogen cyanide
Sweet potato	0.62 ± 0.01	0.69 ± .031	0.19 ± 0.04	0.28 ± 0.01	0.33 ± 0.01	0.14 ± 0.01	0.31 ± 0.01	25.9 ± 0.12
Scent leaf	0.87 ± 0.01	0.89 ± 0.03	0.24 ± 0.02	0.20 ± 0.00	0.49 ± 0.03	0.18 ± 0.01	0.26 ± 0.00	6.1 ± 0.03

Table 1: Quantitative phytochemical compositions of sweet potato and scent leaf.

Samples	Moisture content	Protein	Fats	Fibre	Ash	Carbohydrate
Sweet potato	9.85 ± 0.03	18.43 ± 0.20	3.42 ± 0.02	11.27 ± 0.12	8.85 ± 0.26	48.20 ± 0.12
Scent leaf	9.66 ± 0.12	9.69 ± 0.10	4.41 ± 0.10	16.94 ± 0.12	7.41 ± 0.20	51.89 ± 0.61

Table 2: Proximate compositions of sweet potato and scent leaf.

Samples	Ca	Mg	K	Na	P
Sweet potato	287.24 ± 2.32	217.60 ± 1.39	386.40 ± 1.39	38.07 ± 0.12	316.77 ± 2.70
Scent leaf	50.77 ± 2.31	37.60 ± 1.39	317.07 ± 0.46	57.07 ± 1.01	261.52 ± 0.46

Table 3: Mineral composition of sweet potato leaves.

Samples	Vitamin C	Thiamine	Riboflavin	Niacin
Sweet Potato	19.95 ± 1.02	0.32 ± 0.003	0.65 ± 0.00	2.07 ± 0.01

Table 4: Vitamins composition of sweet potato leaves.

Discussion

Phytochemical

It reveals results of phytochemical composition of sweet potato (*Ipomea batatas*) and scent leaves [41]. The values for cyanogenic glycoside (HCN) content showed that sweet potato leaves had the highest value (25.9 ± 0.12) [42]. The scent leaf and sweet potato leaf shows the presence of polyphenol; scent leaf has higher amount [43]. Polyphenolic compounds in plant have properties to protect human health against some diseases [44]. The two leaves contain high amount of polyphenolics when compared with other vegetables like lettuce, spinach and cabbage [45]. This make the two leaves to have properties that protect the body against allergies, cancer, virus, cardiovascular problems, aging and toxicity (heptato-toxicity) [46]. There was presence of flavonoid, and of course scent leaf has the higher value, which is a great antioxidant [47]. The presence of saponins in both leaves agree with the one reported [48]. Saponin is used in the production of drugs because of its foaming ability, and also use in brewing industry [49]. The presence of tannins in the leaves shows that it has astringent flavours, the bitter taste found in vegetables are associated with tannin [50]. The presence of tannins has antidiabetic, antitumor, antibacterial antioxidant properties [51]. The presence of alkaloids values in the two leaves shows that they are good properties in animal feeding, drug formulations and help in human metabolism [52]. The two leaves contain low amount of oxalates compared to the 930 mg/100 g fresh weight in spinach [53]. Oxalate concentrations in food crops have long been a concern in human [54]. Because of the negative health effects associated with high intake of oxalate levels can cause acute poisoning, resulting in hypocalcaemia, or chronic poisoning in which calcium oxalate is deposited as crystals in the kidneys, causing renal damage [55]. Furthermore, oxalic acid and soluble oxalates can bind calcium, reducing its bioavailability and calcium oxalate itself is poorly utilized by humans [56]. The phytate when combine with iron which behave like a free radical of intense oxidizing action [57]. They prevent an excess of this mineral from harming the intestinal lining, turning into a factor of cancerous degeneration [58]. The two leaves are good source of bioactive compounds and beneficial in pharmaceutical industry [59]. Therefore, sweet potato leaf and scent leaf are good source of biological active compounds because they contain high nutritional values [60].

Proximate

It shows the proximate composition of sweet potato leaves and scent leaves [61]. The values for carbohydrate content (48.20 ± 0.12 and 51.89 ± 0.61) is the highest value because of the starchy nature of the plant [62]. The protein content of sweet potato is 18.43 ± 0.20 compared favorably well with other leaves but quite low when compared to scent leaves 9.69 ± 0.10 [63]. The fibre content of scent leaf was higher than that of sweet potato leave and this makes it a more favorable vegetable since high fibre content of food help in digestion and prevention of colon cancer [64]. Also the fiber content obtained in this study was higher than the value (9.40%) obtained and scent leaf value (7.60%) obtained [65].

Fat content of sweet potato leaves (3.42 ± 0.02) were lower when compared to that of the scent leaf 4.41 ± obtained [66]. The low value shows that both leaves cannot serve as oil vegetables but can be useful as a weight-reducing diets [67]. Excess fat consumption yields to certain cardiovascular disorders such as altherosclerosis, cancer and aging [68]. Moisture content of sweet potato leaf (9.85 ± 0.03) and scent leaf (9.66 ± 0.12) shows a high moisture content making it more prone to deterioration since foods with high moisture content are more prone to perishability [69]. When compared to other work; the higher moisture content value (13.60%) obtained, while the one obtained by was lower with value of (6.67%) for scent leaf [70].

Minerals

It shows the mineral composition of the leaves shows that sweet potato leaves have high content of potassium (386.40 ± 1.32) phosphorus (316.77 ± 2.70) calcium (289.24 ± 2.32) respectively while that of scent leaf has a high content of potassium (317.07 ± 0.46), phosphorus (261.52 ± 0.46) sodium (57.07 ± 1.010, respectively [71]. Children, women of reproductive age and pregnant women are most vulnerable to micronutrient deficiency and anemia [72]. Hence, they need food with high potassium, phosphorus and calcium. Phosphorus and calcium helps to build strong bones and teeth so the consumption of sweet potato and scent leaves can add to daily mineral requirements of each individual. A comparison between sweet potato and scent leaves shows that the scent leave is superior in mineral than scent leaves. However, both leaves

contribute significantly to the nutrient requirements of humans and should be strongly recommended in Nigeria [73].

Vitamins

Vitamins C values 19.95 ± 1.02 and 24.05 ± 1.02 both scent leaf and sweet potato leaf has no significant difference, and are both higher compared to other vitamin like thiamine, riboflavin and niacin which shows low values. That is to say that these leaves contain low vitamins level but the vitamin C content is a little bit higher. Vitamin C is an essential vitamin that the body needs in every meal because it helps in absorption of other nutrients by the body and protect the body against cold, help build strong immune system also protect the body against scurvy.

Conclusion

The study on the two green leafy vegetables *Ipomea batatas* and *Ocimum gratissimum* showed that they are of high nutritionally qualities in terms of proximate composition, phytochemical, minerals and vitamins C contents. These vegetables are readily available and affordable and can serve as cheap sources of essential nutrientsrequired for human nutrition. The toxicity and cytotoxicity level will reduce by proper processing and cooking before consumption and also eliminate the antinutritional factor to safe levels. The research work therefore recommends that the consumption of these leafy vegetables should be promoted in our daily menu as this will help improve our healthy living and reduce food insecurity, thus, the practical use of sweet potato leaves and scent leaves to prevent the growth of food poisoning bacteria is very promising.

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