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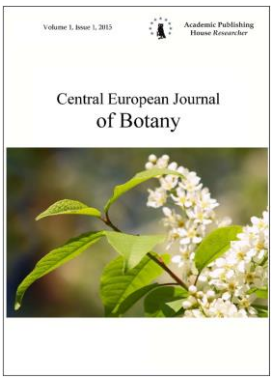

Phytochemical Screening of Selected Varieties of Okro (*Abelmochus Esculentus)* Fruit

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Abstract

Abelmoschus esculentus (Okra) is a plant with several varieties which are consumed for nutritional and medicinal purposes. Its medicinal significance has been reported particularly on diabetes mellitus. This study aimed at investigating the phytochemical quantities of selected varieties of *Abelmoschus esculentus* fruit extracts. Five varieties of the okra plant fruit were each extracted with methanol (80 %) using Soxhlet extractor. The extracts were concentrated at 30°C under reduced pressure in a rotary evaporator to a semi solid extract and finally air dried. Phytochemical contents of each of the methanol extracts of selected okra fruit varieties were evaluated. The results of the study showed different yields of extract where *NHB-AI-B* and *Yar kolon* okra fruit varieties recorded the highest % yield (22.85 and 17.11 %) respectively. Presence of phytochemicals like phenolics, saponins, Tannins, Glycosides and flavonoids were detected in all the varieties. In conclusion, the study showed that selected varieties of okra fruit extract varied in their quantities of phytochemicals and extract yields.

Keywords: *Abelmoschus esculentus,* phytochemical, nutritional, phenolics, saponins, tannins, glycosides, flavonoids.

1. Introduction

One of the most popular vegetable crop in the Indo-Pak subcontinent is Okra (*Abelmoschus esculentus*) (Kumar et al., 2010). It belongs to the Malvaceae family and the most important due to its nutritional and medicinal uses. It is widely distributed from Africa to Asia (Kumar et al., 2010), southern Europe and America (Khosrozadeh et al., 2016). It is a tropical to subtropical crop and is sensitive to frost; low temperature, water logging and drought conditions, and it is adapted to conditions of its cultivation from country to country (Khatun et al., 2011).

Its green tender fruits is the favorite for consumption purposes as a vegetable (Chekole, 2017). Okra fruits are rich in vitamins, calcium, potassium and other minerals (Ülger et al., 2018). The mature okra seed is a good source of oil and protein has been known to have superior nutritional quality (Fekadu Gemede, 2015). Okra seed oil is rich in unsaturated fatty acids such as

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linoleic acid, which is essential for human nutrition (Ndangui et al., 2010). Its mature fruit and stems contain crude fiber, which is used in the paper industry (Chanchal et al., 2018).

Phytochemical studies exhibited that polysaccharides, polyphenols, flavonoids, tannins, sterols and triterpenes are the major components of *A. esculentus* with various biological activities (Jima, Megersa, 2018). It has been reported that the okra powder plays antidiabetic and antihyperlipidemic roles in diabetic rats (Chikezie, 2015). Dietary fibers and polyphenols which are abundantly found in *A. esculentus*, may contribute to the hypoglycemic and hypolipidemic effects of *A. esculentus* (Nazar et al., 2016). The aim of the study is to evaluate and quantify the phytochemical contents of selected varieties of *Abelmoschus esculentus* Fruit.

2. Materials and methods

Plant Collection/Identification

Abelmoschus esculentus fruit varieties were obtained from a farm located at the Faculty of Agricultural Sciences, Abubakar Tafawa Balewa University, Bauchi. The plant material was identified and authenticated at the Department of Biological Science, Abubakar Tafawa Balewa University, Bauchi.

Plant Extraction

Okra fruit varieties were each extracted following the method described by Doreddula *et al* (2014) with modification in extraction time (12 h). The okra was grounded using pestle and mortar. The powdered material was then sonicated in 80 % methanol for 1 h and then extracted using Soxhlet for 12 h at room temperature. The extract was filtered, and the filtrate was concentrated at 30^{o}C under reduced pressure in a rotary evaporator until a crude solid extract was obtained which was then air dried. The dried extract was put in an air-tight container and kept in a refrigerator at 4^{o}C until used.

Phytochemical Screening

Preliminary qualitative phytochemical tests for the detection of phenols, flavonoids, alkaloids, tannins, saponins, and glycosides was conducted using methods descried by AOAC (1984).

Quantitative phytochemicals Screening

Determination of total phenolic content

The total phenolic content of extract was measured using Folin–Ciocalteu reagent. The extract was solubilized in distilled water. After that 1 ml of sample was mixed with Folin–Ciocalteu reagent (5 ml), sodium carbonates (4 ml) and distilled water (5 ml). This solution was kept at room temperature for 30 min, and the absorbance of solution was measured at 760 nm in a spectrophotometer. A set of reference standard solutions of Gallic acid (1, 2, 3, 4 and 5 ppm) were prepared. Total phenolic content was calculated using Gallic acid as standard (Madaan et al., 2011).

Determination of total flavonoid content

Aqueous extract (500 µl) was mixed with ethanol (1.5 ml), aluminum nitrate (100 ml, 10 %), potassium acetate (100 ml, 1 M) and water (2.8 ml). The solution was kept at ambient temperature for 40 min and the absorbance of solution was measured at 425 nm using a spectrophotometer. Total flavonoid content was recorded according to a standard established curve with quercetin (Mohsen, Ammar, 2008).

Determination of tannin content

Stock solution of 1 mg/ml of tannin acid was prepared by dissolving 10 mg of accurately weighed tannic acid in water. Aliquots (10 ml) were taken in clear test tube and 1 ml of Folin-Denis reagent, 1 ml of sodium carbonate solution was added to each test tube. Each tube was made up to 10ml with distilled water. All the reagents in each tube were mixed well and kept undisturbed for about 30 min and read at 760 nm against blank reagent in a spectrophotometer. A set of reference standard solutions of Tannic acid (1, 2, 3, 4 and 5 ppm) were prepared in the same manner as described earlier (Polshettiwar et al., 2007).

Determination of total Saponin

Crude saponin extracts (10ml) were dissolved in 5 ml of 50 % aqueous methanol. 2.5 ml of aliquot was transferred to test tubes into which an equal volume of vanillin reagent (8 %) was added followed by 72 % (v/v) sulphuric acid. The mixture was mixed and placed in a water bath adjusted at 60 °C for 10 min. The tubes were cooled on an ice-cold water bath for 3 to 4 min and absorbance of yellow color reaction mixture was measured at 544 nm using a UV–Vis

spectrophotometer (UV–1800 Shimadzu) against a blank containing 50 % aqueous methanol instead of sample extract. A set of reference standard solutions of Diosgenin (1, 2, 3, 4 and 5 ppm) were prepared in the same manner as described earlier. The saponin concentrations were calculated from standard curve and expressed as mg Diosgenin equivalents (DE) per g crude extract (Hiai et al., 1976; Baccou et al., 1977).

3. Results

Table 1. Percentage Yield of Methanol Extracts of Abelmochus esculentus Fruit Varieties

Sample	Weight (g)	Yield	% Yield
Clemson Spinless	240.00	38.00	15.83
LD-88	255.00	29.00	11.37
NHB-AI-B	254.00	58.03	22.85
NHAE-47-4	285.00	40.36	14.04
Yar Kolon	282.00	48.24	17.11

Table 2. Phytochemical Profile of Methanol Extracts of *Abelmochus esculentus* Fruit Varieties

Samples	**Saponins**	**Tannins**	**Flavonoids**	**Alkaloids**	**Steriods**	**Glycosides**	**Phenolics**
CLEMSON SPINLESS	++	++	++	-	+	++	+
LD-88	++	+++	+	-	-	+++	++
NHB-AI-B	++	++	++	-	-	++	++
NHAE-47-4	+	++	-	-	-	+	+
YAR KOLON	+	+	++	+	-	+	+++

Notes: +: Present - : Absent

Table 3. Phytochemical Content of Methanol Extracts of Abelmochus Esculentus Fruit Varieties

	Phytochemicals			
Samples	Saponins (mg/g of Diosgenin)	Tannins (mg/g of tannic acid)	Flavonoids (mg/g of Quercetin)	Phenolics (mg/g of Gallic acid)
CLEMSON SPINLESS	132.8	3.3	0.0041	1.685
LD-88	164.0	2.1	0.0017	3.432
NHB-AI-B	151.1	2.3	0.0017	3.475
NHAE-47-4	156.6	2.4	0.0052	2.142
YAR KOLON	115.1	2.4	0.0067	4.066

4. Discussion

Table 1 shows percentage yield of selected varieties of *Abelmochus esculentus* fruit after extraction with methanol. *Clemson spinless* had a percentage yield of 15.88 %, *LD-88* (11.37 %), *NHB-AI-B* (22.85 %), while *NHAE-47-4* and *Yar Kolon* had yields of 14.04 % and 17.11 % respectively, this can be attributed to the fat that the plans adaptation varies from variety to variety

and also to location peculiarities as reported by Gemede (2015). From the result of the study, *NHB-AI-B* had the highest yield while *LD-88* had the lowest yield.

Table 2 shows the qualitative phytochemical analysis of selected varieties of *Abelmochus esculentus* fruit extracts. The result identified the presence of phytochemicals like saponins, tannins, flavonoids, and phenols in all the selected varieties , this is in consonance with the findings of Kumar et al. (2010).

Quantitative phytochemical analysis showed that selected okra varieties varied in their quantities of phytochemicals. Highest quantity of phenolic compounds and flavonoids was found in *Yar Kolon* variety (4.066 mg/g and 0.0067 mg/g) respectively. *LD-88* had the highest quantity of saponins (164.0 mg/g). Higher quantities of Tannins were found in *Clemson spinless* (3.3 mg/g) as shown in Table 3, attributed to varying degree of adaptation to environment, specie and cultivation as stated by Bello, Ayanda, Aworunse, Olukanmi (2018).

5. Conclusion

Based on the findings of this study, it is concluded that the methanol extracts of selected varieties of *Abelmoschus esculentus* fruit contain various phytochemicals constituents but their quantities vary hence, they have the capacity to exert some biological activity and will be useful in disease intervention.

6. Recommendations

Further research to identify and isolate all the bioactive components of different okra fruit varieties is recommended.

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