

Investigation of Some Constituents of Two Plants (*Alternanthera philoxeroides* and *Alternanthera sessilis*) of Amaranthaceae Family

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The phytochemicals, fatty acids (both free and bound), ascorbic acid and iron content of two species (*Alternanthera philoxeroides* and *Alternanthera sessilis*) of Amaranthaceae family available in Bangladesh were analysed and quantified.

The plant family Amaranthaceae¹ contains about 160 genera and 2400 species. Most of the plants of this family are used as medicine in various diseases². The two species *Alternanthera philoxeroides* and *Alternanthera sessilis* are also used as leafy vegetables in Bangladesh. Antimicrobial activity of *Alternanthera philoxeroides*³⁻⁴ has been evaluated. Phytochemical investigations on *Alternanthera philoxeroides*⁵ and *Alternanthera sessilis*⁶ have been carried out.

The plants *Alternanthera philoxeroides* (locally known as 'Henchi Shak') and *Alternanthera sessilis* (locally known as 'Chenchi Shak') have been collected from the local market of Dhaka city and these were identified at the Department of Botany, Dhaka University. The plant materials (leaves and stems) were separated from the roots and cleaned thoroughly. These were dried under mild sunlight and then at 40°C in an oven. The dried plants were powdered in a grinding machine (Cyclotec, with 0.5 mm screen) and these powders were used throughout the investigation.

Phytochemical screening of the plants (*Alternanthera philoxeroides* and *Alternanthera sessilis*) was carried out from their extracts using standard procedure⁷ to identify the constituents and the results are given in Table 1. The percentages of crude alkaloid, flavonoid, tannin, steroid, terpenoid and saponin of the two species (*Alternanthera philoxeroides* and *Alternanthera sessilis*) were quantitatively determined⁷ and their results are given in Table 2.

Ascorbic acid of the two species (*Alternanthera philoxeroides* and *Alternanthera sessilis*) was extracted with meta-phosphoric acid and its amount was estimated spectrophotometrically using 2,4-dinitrophenylhydrazine (DNPH) method⁸. The ash contents were determined by standard method and iron contents were estimated⁹ and the results are given in Table 3. The free and bound fatty acids of two species (*Alternanthera philoxeroides* and *Alternanthera sessilis*) were isolated¹⁰ from petroleum ether (b.p 40°-60°C) extracts and analysed as their methyl esters¹⁰ by GLC (Shimadzu 9A, Column BP-50, detector-FID, at 170° to 270°C, rising temperature 4°C/min for 30 minutes). The results are given in Table 3, 4 and 5.

Phytochemical screening of the plants (*Alternanthera philoxeroides* and *Alternanthera sessilis*) indicates that both

the species contain (Table 1) alkaloid, steroid, saponin, flavonoid and tannin. In addition to this, presence of terpenoid was detected in *Alternanthera philoxeroides*. The percentage of crude alkaloid was found almost similar but percentages of flavonoid and saponin were found to be higher in *Alternanthera philoxeroides* than that of *Alternanthera sessilis* (Table 2). The medicinal importance of these plants may be explained on the basis of this finding.

The result (Table 3) indicated that both the leaves are good sources of vitamin C. About 200 g of the leaves of these species might fulfill our daily requirement of ascorbic acid and hence their use as leafy vegetables may be encouraged to the local people.

The amount of ash content was found to be higher in *Alternanthera philoxeroides* than that of *Alternanthera sessilis* (Table 3) indicating the presence of higher percentages of minerals in *Alternanthera sessilis*. Both the plants (*Alternanthera philoxeroides* and *Alternanthera sessilis*) contain a considerable amount of dietary iron (Table 3). So, these plants may play an important role in the nutrition of our health as a combined source of iron and ascorbic acid.

In both plants the amount of fatty acids existing in free state was less than the fatty acids associated with lipids or esterified to other organic compounds (Table 3). The analysis of free fatty acids (Table 4) showed that stearic and lignoceric acids are common in both the species but *Alternanthera sessilis* contains highest proportion of stearic acid (72.68 %) but *Alternanthera philoxeroides* contains highest proportion of lignoceric acid (41.98 %). In addition to this *Alternanthera sessilis* contains behenic acid (8.22 %) but *Alternanthera philoxeroides* contain myristic acid (35.47 %). Analysis of bound fatty acids (Table 5) indicated that palmitic, oleic and stearic acids are common in both the plants and oleic acid was found to be highest in both *Alternanthera philoxeroides* (61.45%) and *Alternanthera sessilis* (53.10 %). In addition to these acids, behenic (5.54 %) and lignoceric (12.47 %) acids were found to be present in small proportion in *Alternanthera sessilis* and palmitoleic acid (8.41 %) was found to present in *Alternanthera philoxeroides* as bound fatty acids. The composition of free and bound fatty acids of these two species indicates that these are useful as edible purpose.

From all these analytical data it can be concluded that as leafy vegetables these two plants (*Alternanthera philoxeroides* and *Alternanthera sessilis*) serve nutritional aspects as well as lipid supplement in food in addition to their medicinal effect.

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Table 1. Qualitative analysis of the phytochemicals of *Alternanthera philoxeroides* and *Alternanthera sessilis*

Plant	Alkaloid	Tannin	Saponin	Flavonoid	Steroid	Terpenoid	Cardiac glycoside
<i>Alternanthera philoxeroides</i>	+	+	+	+	+	-	-
<i>Alternanthera sessilis</i>	+	+	+	+	+	+	-

Table 2. Percentage (dry powder basis) of crude alkaloid, flavonoid and saponin of the two species

Plants	Alkaloid (%)	Flavonoid (%)	Saponin (%)
<i>Alternanthera philoxeroides</i>	0.22	1.37	4.7
<i>Alternanthera sessilis</i>	0.20	0.94	2.4

Table 3. Amount of ascorbic acid, ash, iron, petroleum ether extract, free fatty acids and bound fatty acids in the two species

Plants	Ascorbic acid ^a	Ash ^b	Iron ^c	Petroleum ether extract ^d	Free fatty acids ^e	Bound fatty acids ^f
<i>Alternanthera philoxeroides</i>	50	19.14	1.65	1.42	0.04	0.07
<i>Alternanthera sessilis</i>	72	13.14	1.05	1.65	0.06	0.08

a: mg/100g of fresh leaves; b: g/100g of dry powder; c: mg/100g of dry powder; d: Percentage on dry powder basis; e & f : g/100 g of petroleum ether extract.

Table 4. Free fatty acids (relative percentage) of the two species

Plants	Stearic acid	Lignoceric acid	Myristic acid	Behenic acid
<i>Alternanthera philoxeroides</i>	22.55	41.98	35.47	-
<i>Alternanthera sessilis</i>	72.68	19.10	-	8.22

Table 5. Bound fatty acids (relative percentage) of the two species

Plants	Palmitic acid	Oleic acid	Stearic acid	Palmitoleic acid	Behenic acid	Lignoceric acid
<i>Alternanthera philoxeroides</i>	24.48	61.45	5.65	8.41	-	-
<i>Alternanthera sessilis</i>	23.60	53.10	5.30	-	5.54	12.47

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