

7.3.3. *Alternanthera sessilis* (L.) DC., Cat. Hort. Monsp. 77 (1813); Boulos, Fl. Egypt 1: 142 (1999).

Syns. *Gomphrena sessilis* L., Sp. Pl., ed. 1, 225 (1753);

Alternanthera repens J. F. Gmel., Syst. Nat., ed. 13, 2(1): 106 (1791); sensu Täckh. Stud. Fl. Egypt, ed. 2, 136 (1974).

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Proximate Composition and Lipids

Young leaves of *Alternanthera sessilis* yielded on extraction with chloroform-methanol 0.54% lipids (dry weight). The phytochemical composition of *Alternanthera sessilis*, growing

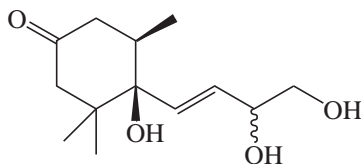
in India is carbohydrates, 1.01; fatty acids, 5.8; protein, 3.0; fiber, 3.5; tannins, 1.2; moisture, 81.0 and nutritive value, 68.65% dry weight (Unni *et al.*, 2009). There are other reports on the proximate composition and nutritional evaluation of *Alternanthera sessilis* (Sreedevi and Chaturvedi, 1993; Li *et al.*, 2008; Barutah and Borah, 2009; Wankhede and Jain, 2010). The plant accumulates Cd (Chandran *et al.*, 2012) and is indicator of the presence of Fe in soil (Singh *et al.*, 2002).

The leaves contain α -tocopherol, 22.0; and β -tocopherol, 6.22 mg/g dry weight (Sridhar and Lakshminarayana, 1993).

Alternanthera sessilis is a rich source of β -carotene and lutein. In addition to lutein, three other xanthophylls have been found *viz.* neoxanthin, violaxanthin and zeaxanthin (Rajyalakshmi *et al.*, 2001; Raju *et al.*, 2006; Belanger *et al.*, 2010; Chandrika *et al.*, 2010). It has a high vitamin A activity (1.37 mg% expressed as retinol equivalent) with total carotenoids 24.02 and β -carotene 8.25 mg% (Rajyalakshmi *et al.*, 2001).

The total lipids (0.54%) of *Alternanthera sessilis* (DC) leaves (*syn.* *Alternanthera denticulata*, *Alternanthera repens* and *Alternanthera triandra*) consisted of neutral lipids (0.30%), glycolipids (0.15%) and phospholipids (0.09%). The fatty acid composition of the neutral lipids are C_{12:0}, 2.9; C_{14:0}, 8.6; C_{16:0}, 26.5; C_{18:0}, 3.1; C_{18:1}, 3.9; C_{18:2}, 22.5; C_{18:3}, 31.7; and C_{20:4}, 0.8% of total fatty acids. The glycolipids contain the following fatty acids: C_{12:0}, 2.0; C_{14:0}, 2.5; C_{16:0}, 20.7; C_{18:0}, 2.0; C_{18:1}, 1.9; C_{18:2}, 2.9; and C_{18:3}, 68.0%. The fatty acid composition of the phospholipids are C_{16:0}, 22.2; C_{18:1}, 3.2; C_{18:2}, 23.7; and C_{18:3}, 50.9%. Unni *et al.* (2009) did not detect stearic acid in the plant and reported that it contains palmitic acid (0.8%) and a mixture of oleic, linoleic and linolenic acids (3.6% dry weight). Hosamani *et al.* (2004) stated that *Alternanthera triandra* Lam (*syn.* *Alternanthera sessilis* (L.) R. Br.) seed oil (8 %) contains a moderate source of ricinoleic acid (12-hydroxyoctadec-*cis*-9-enoic acid, 22.1 %), along with myristic, 3.9; palmitic, 16.9; stearic, 5.9; oleic, 26.0; and linoleic acids, 25.2 %.

Lin and Chen (1975) stated that *Alternanthera sessilis* contains stigmasterol, β -sitosterol, a saturated aliphatic hydrocarbon, saturated aliphatic ester and saturated ester. Lupeol was identified from the roots of *Alternanthera sessilis* (Agrawal and Jain, 1978). The whole herb yielded 24-methylenecycloartenol, cycloeucalenol, stigmasterol, β -sitosterol, campesterol, α -spinasterol, 5 α -stigmasta-7-enol and the palmitates of the preceding steroids (Jou *et al.*, 1979). The occurrence of α - and β -spinasterols in five species of the family Amaranthaceae (including *Alternanthera sessilis*) was reported by Dogra *et al.* (1977). The identification of nonacosane, 16-hentriacontanone and handianol (in addition to β -sitosterol and stigmasterol) from the plant was also reported (Sinha *et al.*, 1984). A mixture of diastereomers of an ionone derivative (**72**) was isolated from the leaves of the plant (Ragasa *et al.*, 2002).



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Alternanthera repens contains alkaloids, saponins, tannins and reducing sugars (Astudillo-Vázquez *et al.*, 2008) and HCN (Arthur, 1954; Jansz *et al.*, 1974).

Alternanthera sessilis was the only accumulator plant for Al, V, Ti and Se among 17 plant species tested by Nadkarni and Chaphekar (1977).

A pharmacognostical study of *Alternanthera sessilis* has been reported (Chen *et al.*, 1992).

Flavonoids and Saponins

The flavone glycoside, robinetin 7-*O*- β -D-glucopyranoside was isolated from the leaves (Sahu and Chakrabarty, 1993).

A saponin having oleanolic acid as aglycone and glucose and rhamnose as sugar moieties, was isolated from the leaves of *Alternanthera sessilis* (L.) R. Br. (Kapundu *et al.*, 1986). Later, a major saponin has been isolated and identified as 3 β -D-glucopyranosyluronic acid-28-*O*- β -D-glucopyranosyl oleanolic acid (Penders *et al.*, 1992). The following triterpene saponins were identified from *Alternanthera repens*: 2 α , 3 β -dihydroxyurs-12, 20(30)-dien-28-oic acid 3-*O*-{*O*- β -D-glucopyranosyl-(1 \rightarrow 2)-*O*- α -L-arabinopyranosyl-(1 \rightarrow 2)-*O*-[β -D-xylopyranosyl-(1 \rightarrow 3)] β -D-glucopyranoside}; 2 α ,3 β -dihydroxyurs-12,20(30)-dien-28-oic acid 3-*O*-{*O*- β -D-quinovopyranosyl-(1 \rightarrow 2)-*O*- α -L-arabinopyranosyl-(1 \rightarrow 2)-*O*-[β -D-xylopyranosyl-(1 \rightarrow 3)] β -D-glucopyranoside}; 2 α ,3 β -dihydroxyurs-12,20(30)-dien-28-oic acid 3-*O*-{*O*- α -L-arabinosyl-(1 \rightarrow)-*O*-[β -D-xylopyranosyl-(1 \rightarrow 3)] β -D-glucopyranoside}; and 2 α , 3 β -dihydroxyurs-12,20(30)-dien-28-oic acid 3-*O*-{*O*- β -D-xylopyranosyl-(1 \rightarrow 3)- β -D-glucopyranoside} (Sanoko *et al.*, 1999).