

### Folk Medicine, Pharmacological and Biological Activities

*Alternanthera triandra* is largely used as a lactagogue and febrifuge (Kirtikar and Basu, 1984). *Alternanthera brasiliana* exhibited antinociceptive effect in mice (Macedo *et al.*, 1999) and is used in native populations (Brazil) as analgesic and anti-inflammatory agent (Delaporte *et al.*, 2005).

Kaempferol 3-*O*-robinobioside and kaempferol 3-*O*-rutinoside, identified from *Alternanthera brasiliana* significantly inhibited the human lymphocyte proliferation *in vitro* (De O. Brochado *et al.*, 2003). The antitumour activity of alternanthin B and *N*-transferuloyl-3,5-dimethoxytyramine, isolated from *Alternanthera philoxeroides* has been reported (Fang *et al.*, 2007). Philoxeroidesides A-D (triterpene saponins from *Alternanthera philoxeroides*) showed cytotoxic activities against SK-N-SH and HL60 cell (Fang *et al.*, 2009a). Oleanolic acid 3 $\beta$ -D-glucuronopyranoside, isolated from the latter species showed antitumour activity (Fang *et al.*, 2009b). The antitumour activity of both *Alternanthera bettzichiana* (Chandrakant *et al.*, 2011) and *Alternanthera tenella* (Guerra *et al.*, 2003) has been proved.

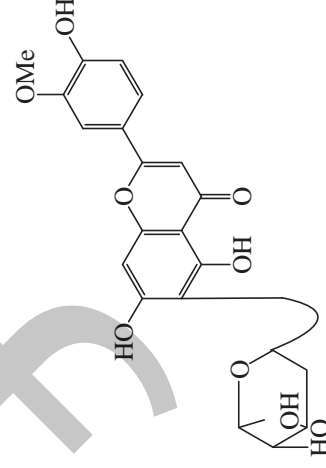
The methanolic extract of *Alternanthera brasiliana* has a significant wound healing potential (Barua *et al.*, 2009). *Alternanthera lanceolata* showed antimalarial activity (Mesa *et al.*, 1998). Both *Alternanthera bettzichiana* (Chandrakant *et al.*, 2011) and *Alternanthera tenella* (Biella Carla *et al.*, 2008) had anti-inflammatory activity.

The extracts of *Alternanthera philoxeroides* possess antiseptic effect on *Bacillus subtilis*, *Bacillus thurmgensis* and *Escherichia coli* (Cheng *et al.*, 2007a). Saponins of *Alternanthera philoxeroides* showed antibacterial and antioxidant activities (Cheng *et al.*, 2007b). The antibacterial and/or antifungal activities of other *Alternanthera* species were also reported *viz.* *Alternanthera brasiliana* Kuntze (Johann *et al.*, 2010), *Alternanthera caracasana* H.B.K. (Canales-Martines *et al.*, 2005), *Alternanthera maritima* (Gasparetto *et al.*, 2010) and *Alternanthera tenella* (Salvador *et al.*, 2009; Silveira *et al.*, 2009). The antiviral activity of *Alternanthera philoxeroides* has been also reported (e.g. Zhang *et al.*, 1988; Jiang *et al.*, 2007). The plant extracts have effect on epidemic hemorrhagic fever virus (EHFV) (Yang *et*

Table 12. Flavonoids of some *Alternanthera* species

Species	Plant part	Flavonoids	References
1. <i>Alternanthera brasiliana</i>		Kaempferol 3- <i>O</i> -robinobioside, kaempferol 3- <i>O</i> -rutinoside, quercetin and other kaempferol and quercetin glycosides	De O. Brochado <i>et al.</i> (2003); Da Silva <i>et al.</i> (2011)
2. <i>Alternanthera maritima</i>	Ap	Vitexin, isovitexin, 2'- <i>O</i> - $\alpha$ -rhamnopyranosylvitexin, 2''- <i>O</i> - $\beta$ -D-glucopyranosylvitexin, isorhamnetin 3- <i>O</i> -robinobioside, isorhamnetin 3- <i>O</i> -rutinoside, quercetin 3- <i>O</i> -rutinoside, kaempferol, quercetin and quercetin 3-methyl ether	Salvador and Dias (2004)
3. <i>Alternanthera philoxeroides</i>		Alternanthin A (71), alternanthin B, 2',5-dihydroxy-6,7-methylenedioxyisoflavone, quercetin, luteolin, chrysoeriol 6-C- $\beta$ -boivinopyranosyl-7- <i>O</i> - $\beta$ -glucopyranoside and 7- $\alpha$ -L-rhamnopyranosyl-6-methoxyluteolin	Zielske <i>et al.</i> (1972); Zhou <i>et al.</i> (1988); He and Meng (1995); Fang <i>et al.</i> (2007a); Fan <i>et al.</i> (2008)
4. <i>Alternanthera tenella</i>		Acacetin, 2''- <i>O</i> - $\alpha$ -L-rhamnopyranosyl-vitexin, 2''- <i>O</i> - $\beta$ -D-glucopyranosylvitexin, vitexin, quercetin and kaempferol	Salvador <i>et al.</i> (2006)

Ap: aerial parts



71 Alternanthin A

*al.*, 1989) and chikusetsusaponin IVa is active against HSV-1 and HSV-2 (Rattanathongkom *et al.*, 2009).

Among the triterpenoid saponins isolated from *Alternanthera philoxeroides*, two exhibited strong molluscicidal activity (Zhao *et al.*, 1999). The aqueous extract of the same species inhibited the growth of *Oncomelania hupensis* snails and finally caused its death (Tan *et al.*, 2009).

Jia *et al.* (1998) reported that *Alternanthera philoxeroides* was highly efficient in treatment of municipal waste water and was resistant to high pollutant concentrations.

The chemical constituents and biological activities of *Alternanthera* species have been reviewed by Chi *et al* (2005) and Li *et al.* (2007c).

The genus *Alternanthera* is represented in Egypt by 3 species (Boulos, 1999).