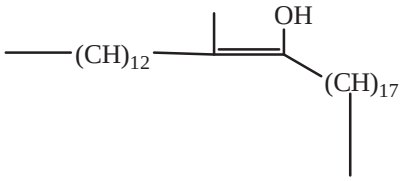
1.5.1. ***Peristrophe paniculata*** (Forssk.) Brummitt, Kew Bull. 38: 451 (1983); Boulos, Fl. Egypt 3: 103 (2002).

Syns. *Dianthera paniculata* Forssk., Fl. Aegypt.-Arab. 7 (1775).

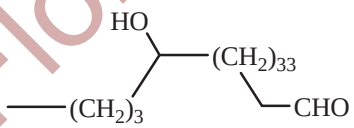
Peristrophe bicalyculata (Retz.) Nees in Wall., Pl. As. Rar. 3: 113 (1832); Täckh., Stud. Fl. Egypt, ed. 2: 503 (1974).

Balatay بالاتاي

Petunidin 3-rhamnoglucoside was identified from the flowers of *Peristrophe bicalyculata* (Tiwari *et al*., 1978). The plant contains vitexin 4-methyl ether and several phenolic acids *viz.* salicylic, *p*-hydroxybenzoic, protocatechuic, syringic and ferulic acids (Daniel and Sabnis, 1987). The isolation of 14-methyl-tritriacont-14-en-15-ol (**153**) and 35-hydroxy-nonatriacontanal (**154**) from the aerial parts of *Peristrophe bicalyculata* Nees, growing in India was reported (Singh *et al*., 2000). β-Caryophyllene (33.9%), α-zingiberene (10.4%), germacrene D and globulol (5%) were reported as the major compounds of the oil of *Peristrophe bicalyculata* (Ogunwande *et al*., 2010).



153 14 -Methyltritriacont-14-en-15-ol



154 35 -Hydroxynonatriacontanal

Peristrophe bicalyculata is used in India for its antibacterial property (tuberculostatic), snake poison, in bone fracture, sprain, fever, cold, cough and for ear and eye treatments (Gaudani *et al*., 2010). The antibacterial (Chopra and Chopra, 1959) and antifungal (Quereshi *et al*., 1997) properties of *Peristrophe bicalyculata* have been reported. The antifungal activity of sitosterol isolated from the plant has been proved and the compound can be useful in controlling plant diseases under field conditions (Singh *et al*., 1994).The plant is used as an antidote for snake poison, antinematode and pesticide (Singh *et al*., 2000). The ethanolic extract of *Peristrophe bicalyculata* possesses anti-inflammatory and analgesic activities (Rathi *et al*., 2003). The oil of *Peristrophe bicalyculata* displayed *in vitro* cytoxicity to MCF-7 (human breast tumour) and MDA-MB-468 (human breast tumour) cells (Ogunwande *et al*., 2010).

The toxicity studies of *Peristrophe paniculata* in Wistar rats showed that both the aqueous and methanol extracts were devoid of any toxicity at the dose level 200 mg/kg/day (Chandran *et al*., 2008).

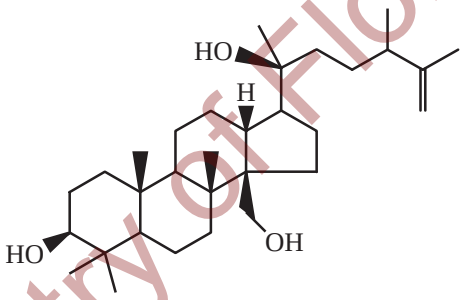
1.6. RUELLIA L.

Constituents

Glucose and fructose were the main free sugars present in the underground organs of *Ruellia gemniflora*, followed by sucrose and other oligosaccharides. The soluble protein amounted to 9.6% (Figueiredo-Ribeiro *et al*., 1986). The amino acids leucine, tyrosine, valine and glycine were identified in *Ruellia tuberosa* (Behari and Goyal, 1984).

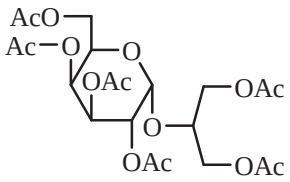
The leaves of *Ruellia prostrata* Poir. yielded a mixture of sterol containing stigmasterol (75.33%), sitosterol (17.6%), 24-methylcholesterol (7.04%), cholesterol (trace) and

brassicasterol (trace) (Banerjee, 1984). A homologous series of *n*-alkanes (C_{11}-C_{17}) was detected in *Ruellia tuberosa* L. The major constituent was tritriacontane (18.0%) followed by pentatriacontane (11.2%), hentriacontane (9.6%) and nonacosane (7.6%). Esters were identified as the esters of an acid series composed mainly of C_{28} (14.0%), C_{30} (13.7%), C_{32} (16.4%) and C_{34} (17.9%) and an alcohol series composed mainly of triacontanol (60%). Stigmasterol, β-sitosterol, campesterol and cholesterol were also detected (Behari *et al*., 1981). The tubers of *Ruellia tuberosa* L. afforded *n*-alkanes (mainly of nonacosane and hentriacontane), lupeol, and the sterols sitosterol, stigmasterol and campesterol (Andhiwal *et al*., 1985). Triacontan-6-one, 5-hydroxytetratriacontan-9-one and *n*-triacontane were isolated from the shoots of *Ruellia tuberosa* (Misra *et al*., 1997). The fatty acids of the seeds of *Ruellia tuberosa* (24%) are $C_{10:0}$ (5.1%), $C_{12:0}$ (3.6%), $C_{14:0}$ (3.8%), $C_{16:0}$ (30.3%), $C_{18:0}$ (7.2%), $C_{18:1}$ (17.5%) and $C_{18:2}$ (32.5%) (Ahmad *et al*., 1979). The presence of capric, lauric and myristic acids in the seed oil of *Ruellia tuberosa* was also reported by Misra *et al*. (1997). A triterpenoid identified as 21 methyldammar-22-en-3β,18,27-triol (**155**) was isolated from the aerial parts of *Ruellia tuberosa* (Singh *et al*., 2002a). 1,8-Cineole and *S*(-) camphor were the most intense compounds of camphoraceous aroma, obtained from the aerial parts of *Ruellia menthoids* (Nees) Hiern. (Facundo *et al*., 2005).



155 21-Methyldammar-22-en-3β,18,27-triol

The fresh buds and flowers of *Ruellia prostrata* contain apigenin, apigenin 7-glucoside, apigenin 7-glucuronide, luteolin and luteolin 7-glucoside (Subramanian and Nair, 1972). The isolation of apigenin 7-β-D-glucuronide from *Ruellia tuberosa* was reported by Wagner *et al*. (1971). The leaves of *Ruellia tuberosa* contain traces of apigenin and luteolin, while its deep violet flowers had appreciable quantities of malvidin 3,5-diglucoside. The yellow buds contain the maximum proportion of flavonoids, yielding ~ 3% of apigenin 7-*O*-glucuronide; the other flavones were apigenin 7-*O*-glucoside, apigenin 7-*O*-rutinoside and luteolin 7-*O*-glucoside (Nair and Subramanian, 1974). Daniel and Sabnis (1987) identified the flavonoids apigenin and echioidin in *Ruellia baikiei* Woodr. and echioidin and scutellarein in *Ruellia tuberosa* Linn. *p*-Hydroxybenzoic, vanillic, syringic and melilotic acids were identified in *Ruellia colorata* Wall, and protocatechuic, syringic, 3-hydroxy-4-methoxybenzoic and *p*-coumaric acids from *Ruellia tuberosa* L. (Daniel and Sabnis, 1987). Taxiphyllin (a cyanogenic glucoside) was isolated from *Ruellia rosea* Mart. Betaine and trigonelline were identified in the plant as well as in *Ruellia graecizans* Bocker, *Ruellia portellae* Hook. f., and *Ruellia tweedieana* Griseb (Fischer *et al*., 1988). A glycoside, 2-*O*-α-D-galactopyranosyl glycerol hexaacetate (**156**) was isolated from the whole plant of *Ruellia brittoniana* (Ahmad *et al*.,1990). Tetramethylputrescine was isolated from the roots and aerial parts of *Ruellia rosea* (Johne *et al*., 1975).



156 2-*O*-α-D-Galactopyranosyl glycerol hexaacetate

Folk Medicine, Pharmacological and Biological Activities

The juice of the leaves of *Ruellia prostrata* Poir., boiled with little salt, is supposed on the Malabar Coast to correct a depraved state of the humors. They are sometimes given as a remedy of gonorrhea. The root of *Ruellia suffruticosa* Roxb. is used by the Santals in gonorrhea, syphilis and renal affections (Kirtikar and Basu, 1984). The aqueous and petroleum ether extracts of *Ruellia prostrata* possess antifertility effect (Andhiwal *et al*., 1986). The methanolic extract of *Ruellia praetermissa* Sceinf. ex Lindau possesses estrogenic and possible cholinergic effect. The estrogenic effect could have been generated by plant sterols (β-sitosterol and stigmasterol) and flavonoids (luteolin and apigenin), while cholinergic effect could be due to iridoid glucosides (Salah *et al*., 2002). The purgative effect of *Ruellia praetermissa* has been reported. Luteolin, apigenin and iridoid glucosides (taxiphyllin and 8-*epi*-deoxyganic acid) might be at least in part responsible for this effect (Salah *et al*., 2000).

Ruellia tuberosa is used as a folk medicine in Taiwan due to its diuretic, diabetic, antipyretic, analgesic and antihypertensive properties. It is also used as one of the components in a herbal drink in Taiwan (Chen *et al*., 2006a). *Ruellia tuberosa* was reported to possess potent antioxidant activity (Chen *et al*., 2005, 2006a), antinociceptive and anti-inflammatory properties (Alam *et al*., 2009).

The genus *Ruellia* is represented in Egypt by one species.

1.6.1. ***Ruellia patula*** Jacq., Misc. Austr. Bot. 2: 358 (1781); Boulos, Fl. Egypt 3:101 (2002).

Foul فُول

Three flavonoid glycosides, demethoxycentaureidin 7-*O*-β-D-galacturonopyranoside, pectolinarigenin 7-*O*-α-L-rhamnopyranosyl-(1'''→4'')-β-D-glucopyranoside and 7-*O*-α-L-rhamnopyranosyl-(1'''→4'')-β-D-glucuronopyranoside, a megastigmane glucoside, byzantionoside B 6'-*O*-sulfate, a (Z)-hex-3-en-1-ol *O*-β-D-xylopyranosyl-(1''→2')-β-D-glucopyranoside, were isolated from leaves of *Ruellia patula*, together with 12 compounds, β-sitosterol glucoside, vanilloside, bioside (decaffeoyl verbascoside), acteoside (verbascoside), syringin, benzyl alcohol. *O*-β-D-xylopyranosyl-(1''→2')-β-D-glucopyranoside, cistanoside E, roseoside, phenethyl alcohol, *O*-β-D-xylopyranosyl-(1''→2')-β-D-glucopyranoside, (+)-lyoniresinol 3α-*O*-β-D-glucopyranoside, isoacetoside and 3,4,5-trimethoxyphenol *O*-α-L-rhamnopyranosyl-(1''→6')-β-D-glucopyranoside (Samy *et al*., 2011).

Dicoumarol, 7-hydroxy-4-methylcoumarin, stigmasterol, stigmasterol-6-en-3β-ol and compesterol were also identified from *Ruellia patula* (Muthumani *et al*., 2009).

The following seventeen compunds were identified from the leaves of *Dipteracanthus patulus* (Jacq.) Nees (syn. *Ruellia patula* Jacq.): 3,3-dimethyl octane ($C_{10}H_{22}$, 3.06%), 2,6-