Chemistry of Natural Compounds, Vol. 44, No. 6, 2008

CHEMICAL COMPOSITION OF *Callistemon polandii* LEAF AND STEM ESSENTIAL OILS FROM THE PLAINS OF NORTHERN INDIA

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Callistemon (Myrtaceae) was first described by Robert Brown in 1814 as "a genus formed of those species of *Metrosideros* that have inflorescence similar to that of *Melaleuca* and distinct elongated filaments" [1]. Due to this very reason the genus *Callistemon* is commonly known as "Bottle brush" comprised about 30 described species together with at least a further seven undescribed species, all of which are endemic to Australia [2–4]. *Callistemons* (bottle brushes) are shrubs or small trees indigenous to Australia and New Caladonia. Many species grow in moist areas, often by creeks, whereas others are found on rock outcrops and ledges on mountain tops [5]. In India, *Callistemon* spp. were introduced as ornamental plants throughout the country, except in extremely dry and cool places [6]. In India ten species of *Callistemon*, including *C. polandii,* are found [7, 8]. The good looking spikes have made bottle brush a very popular ornamental plant for houses, offices, and gardens and new cultivars and hybrids are constantly being developed [7].

The essential oil of *C. lanceolatus* DC. has been reported to possess fungicidal activity [9, 10]. The oil of *C. lanceolatus* leaf has also been reported to restore the vitellogenin activity of allalectomized *Drysderus koengii* Fabr [11] and possess bee repellent [12] activity. On the other hand, the oil of *C. viminalis* leaf showed *in vitro* anthelmintic activity against earthworms, tapeworms, and hookworms, while an aqueous extract of the flowers and leaves showed antibacterial activity against Gram-positive bacteria [13].

Although the essential oil composition of the genus *Callistemon* from different parts of the world has been studied [5, 7, 8]. However, the leaf and stem essential oil constituents of *C. polandii* from India have not been studied in detail. This prompted us to carry out a detailed GC and GC-MS analysis of *C. polandii* leaf and stem oils from the plains of Northern India.

The essential oils were obtained by conventional hydrodistillation of leaf and stem of *C. polandii* in a Clevenger- type apparatus. Each gave essential oil in 0.008% and 0.004% yield (v/w) on a fresh weight basis. GC and GC/MS analysis of the oils resulted in the identification of a total of 60 and 44 constituents, representing 98.2% and 99.9% of the oils from the leaf and stem, respectively. The relative concentrations of the volatile components identified are presented in Table 1, according to their elution order on a BP-1 column. The major constituents in the leaf oil of *C. polandii* were palmitic acid (25.2%), myristic acid (10.8%), and caryophyllene oxide (9.6%), while the major constituents of the stem oil were palmitic acid (31.7%), caryophyllene oxide (6.4%), myristic acid (5.9%), and 9-hexadecanoic acid (5.6%). On comparing our stem oil results with those of leaf, it was observed that out of 44 and 61 compounds present in stem and leaf oils, respectively, 40 compounds were common in both the oils. The major compounds in both oils were palmitic acid (31.7% and 25.2%), caryophyllene oxide (6.4% and 9.6%), myristic acid (5.9% and 10.8%), and 9-hexadecanoic acid (5.6% and 1.3%) respectively. Thus, palmitic acid and 9-hexadecanoic acid were 1.3 and 4.3 times higher in the stem oil. On the other hand, caryophyllene oxide and tetradecanoic acid were 1.5 and 1.8 times less in stem oil than in leaf oil. Similarly, the compositions of *p*-cymene, tridecanoic acid, phenylethyl-*n*-octanoate, spathulenol, τ-cadinol, terpenyl-*n*-butyrate, α-phellandrene, and cubenol were also very close in stem and leaf oils.

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0009-3130/08/4406-0807