



## Chemical composition of the essential oil of *Abies guatemalensis* Rehder, an endangered species from Guatemala.

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*Abies guatemalensis* Rehder, grows in moist or wet forests of the high mountains and volcanoes of the west of Guatemala, mainly at 2700-3500 m at the provinces of Quiché, Totonicapán, Huehuetenango, Quetzaltenango, San Marcos. It is also found at Chiapas, Oaxaca and Guerrero, in Mexico. *A. guatemalensis*, a tree 45 m high with a trunk almost 1 m in diameter, shows branches dark or grayish brown, leaves appearing 2-ranked, spreading-ascending, linear, 1-4.5 cm long, 1-2 mm wide (1). The principal use of the tree is for decorative purposes. Because of this, it is the only Guatemalan tree comparable to Christmas trees found in Europe and the United States. The small trees have a high demand for this purpose among the foreign and local residents leading almost to its extinction. Thus, since 1979 the tree is protected as endangered species listed in Appendix I of CITES (2) and it is only sold during December at a limited scale with a certificate when cut at controlled forests. Leaves of *A. guatemalensis* were collected in January 2014, from a population found at Mixco, province of Guatemala, at 1600 m, in a site surrounded by pines, at 20 km west from Guatemala City. The oil from 40.0 g of dried material was extracted by hydrodistillation using a Clevenger-type apparatus for 2 h yielding 0.25% (w/w). The GC/MS analyses were carried out in a Shimadzu 2010 Plus system coupled with a Shimadzu QP-2010 Plus selective detector (MSD), equipped with a DB5-MS capillary fused silica column (60 m, 0.25 mm I.D., 0.25 µm film thickness). The oven temperature program initiated at 60 °C, then rose at 3 °C/min to 246 °C, held for 20 min. The carrier gas was He (99.999%) with a flow rate of 1.03 mL/min; split ratio of 1:50. Mass spectra were taken at 70 eV. The m/z values were recorded in the range of m/z 40–700 Da. GC/FID analyses were carried out using a Shimadzu 2010 GC apparatus equipped with a DB5 fused-silica capillary column (60 m, 0.22 mm i.d., film thickness 0.25 µm, Restek, France). The oven temperature was set from 60 °C to 246 °C at 3 °C/min and then held isothermally at 246 °C for 20 min. The carrier gas was N<sub>2</sub> (1.44 mL/min). The identification of the oil components was done by the evaluation of their mass spectra and retention indices. The compounds found in higher concentration were predominantly terpenes, with β-caryophyllene (30.4%), limonene (13.8%) and α-pinene (10.1%) as the major components. This is the first report on the oil composition of this plant and the results would be useful as basic information for the management of the species and to evaluate the production of the oil from wastes from the pruning of commercial forests.

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