







RESEARCH ARTICLE

Variability of Essential Oil and Wax in Needles of *Abies pinsapo* Boiss. (Pinaceae)

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ABSTRACT

Spring needles of *Abies pinsapo* Boiss. contained 84 identifiable volatile compounds. Monoterpene hydrocarbons dominated the essential oil (86.2%), with β -pinene (34.8%), α -pinene (24.6%), and limonene+ β -phellandrene (11.9%) as the major constituents. Stepwise discriminant analysis distinguished young needles from 1- and 2-year-old needles. The average nonacosan-10-ol content was 36.9%, with minimal differences among age classes. Needle *n*-alkanes ranged from C₁₆ to C₃₃, dominated by C₂₉ (19.02%), C₂₃ (18.89%), C₂₇ (17.62%), and C₂₅ (13.01%). The most abundant *n*-alkanes were C₂₃ in young, C₂₇ in 1-year-old, and C₂₉ in 2-year-old needles. The total Carbon Preference Index of *n*-alkanes ranged from 3.2 to 7.3 (mean 4.6), peaking in young needles (6.0). The total average chain length ranged from 24.7 to 27.2 (mean 26.2). Principal component analysis also separated young needles from older ones.