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Increase of monoterpene emissions after artificially induced stomatal closure

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Vegetation was identified being the major source of volatile organic compounds (VOC) emitted to the atmosphere. However, there are still large uncertainties concerning the factors controlling the emission of VOC from plants. Previous investigations have demonstrated that a rapid decrease in stomatal conductance does not significantly alter the emission rate of isoprene or monoterpenes. To study the effect of stomatal aperture on different VOC species, we investigated the emission of various compounds during the artificially induced closure of the stomata by application of abscisic acid (ABA). The experiments were carried out with two oak species: the isoprene emitting species *Quercus robur* and the monoterpene emitter *Quercus ilex*. Analysis of volatile organics was performed online by PTR-MS and offline by collection on adsorbent tubes and subsequent GC-FID analysis. Since the emission of isoprene was maintained after induction of stomatal closure with ABA, it confirmed the insensitivity of isoprene emission to stomatal aperture. However, we observed an increase in the emission of all monoterpene species directly after ABA application and stomatal closure. Moreover, the increase of the emission of each measured monoterpene species was different. We presume two possible reasons of this increase in the monoterpene emission after ABA application and stomatal closure: (1) an indirect or direct effect of ABA on the isoprenoid metabolism and (2) an influence on the pH of the chloroplast stroma after stomatal closure and thereby an influence on the monoterpene-synthase activity. Since emissions of isoprene and monoterpenes were persistent for several days after stomatal closure, we conclude that various substrates were used for the isoprenoid synthesis.