Detection of biogenic volatile organic compounds emitted from common tropical plant species in the Western Ghats region of India: chamber-based experiments

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This study deals with emission of biogenic volatile organic compounds (BVOCs) from some common plant species found in the Western Ghats of India using branch-enclosure experiments. A custom-made dynamic chamber system was deployed to collect samples from seven different plant species. Analysis of speciated BVOCs was performed using C_2–C_6 and C_6–C_{12} VOC analysers to determine the emission composition and relative concentration. Isoprene was the most abundant compound, followed by ethene, propene, α-pinene and β-pinene. Among the plant species, *Tectona grandis*, *Bambusa vulgaris* and *Psidium guajava* showed high fractions of isoprene emission, *Saraca asoca* showed moderate emission, and *Manilkara zapota* and *Leucaena leucocephala* showed the lowest emission. However, *M. zapota* and *L. leucocephala* showed higher emission of both ethene and propene compared to isoprene. This study emphasizes the importance of emission flux measurements of major plant species in different forest regions of India, which is necessary to make emission inventories of important BVOCs.

Keywords: Biogenic volatile organic compounds, chamber experiment, emission composition, relative concentration, tropical forests.

Among the other BVOCs, alkane and alkene (~30%) and oxygenated volatile species (~60%) are the major compounds in some forest regions[7,8]. These reactive trace compounds play a key role in regional atmospheric chemistry and climate[7,9]. BVOCs are an important component of plant physiology and are involved in plant growth, reproduction and defence mechanisms[10–12]. The emissions are sensitive to abiotic environmental factors like temperature, relative humidity (RH), carbon dioxide (CO_2) and light intensity[13–15]. Therefore, the composition and flux of BVOCs emitted from the terrestrial plants are known to show strong species-to-species variations[16,17]. Studies on some tropical plant species have shown that climate change (global warming) can bring a change in BVOC emissions in response to induced stress[18].

Emissions from the tropical regions contribute more than 70% to the global budget of total BVOCs[19,20]. The South Asian region, consisting of about 15% of the world's tropical forests region as of 2010 (ref. 21), has a rich diversity of tropical plant species. However, limited information is available on their BVOC emission characteristics[6,17,22–25]. Nonetheless, it is important to study the BVOC emissions from tropical vegetation in view of their key role in chemistry–climate interactions. Among the South Asian