Abstract

Isoprene is the single largest contributor to the overall biogenic volatile organic compound
(BVOC) emissions and can form secondary pollutants such as tropospheric ozone on reacting
with anthropogenically emitted nitrogen oxides affecting the air quality and climate. Populus
deltoides is an important commercial timber source and planted over an area of ~3120 km 2 as
part of agroforestry practices in north India alone. Here, we present measurement results
quantifying isoprene emission fluxes (EF iso) from Populus deltoides growing in their natural
environment in north India during the monsoon and post-monsoon seasons using dynamic
branch cuvettes coupled to real-time Proton Transfer Reaction- Mass Spectrometry (PTR-
MS) and Thermal Desorption Gas Chromatography-Flame Ionization Detection (TD-GC-
FID). There was excellent agreement between isoprene measurements obtained using the
PTR-QMS and TD-GC-FID (r=0.98). We also measured water vapor and carbon dioxide
using a Cavity Ring Down Spectrometer (CRDS) along with PAR and temperature for
mechanistic insights regarding the emission process. The daytime measured isoprene
emission flux (EF iso) ranged from 0.1-67.8 μg g −1 hr −1 and 0.2-18 μg g −1 hr −1 for the monsoon
and post-monsoon seasons, respectively. Previous studies using other methods, have reported
average (normalized to 1000 μmol m -2 s −1 and 30 °C) isoprene emissions ranging from 37 μg
g −1 hr −1 by Evans et al. (1982) to 53.6 ± 11 μg g −1 hr −1 by Singh et al. We will discuss the
relevance of our results in the context of EF iso calculated using the MEGAN BVOC emission
model and regional air quality.