Abstract

Rapid urbanization and industrialization causes environmental degradation as a great threat to all developing nations. The present study has determined the levels of Particulate Matter (PM) 2.5, its associated metals and hydrocarbons as well as Benzene, Toluene and Xylene in the ambient air of Lakhmoni oil field, Bokota, Assam in north-eastern India. Monitoring of PM2.5 was carried out at two sites throughout the four seasons along with the metals Pb, Cd, Co, Ni, Cr, Cu, Co, Mg, Zn, Fe and aliphatic-aromatic hydrocarbons. SEM images proved the loadings of PM2.5 in the contaminated sites. The concentration of PM2.5, its associated metals and hydrocarbons were found to be lower with distance from oil field. Higher levels of PM2.5 were measured during the winter seasons. The low wind speed, relatively stable temperature, and high humidity during the winter favour the accumulation of PM2.5 and act against its dispersion. FT-IR, TGA and GC-MS analysis of PM2.5 showed the presence of higher alkanes (C_{22}–C_{33}), aromatic hydrocarbons that could be traced to crude oil. Significant inter-correlation among the PM2.5 associated metals indicated that the origin of these metals was most likely to be the same, and this common source was due to the operations at the ONGCL station including transportation of crude oil, drilling operations, gas flaring and venting processes. The *Antheraea assama* (Muga) worm feeds on the leaves of *Machilus bombycina* plant, and the impacts of air quality on its survival were further investigated by analysing the leaves of the plant, the plantation soil and the *A. assama* cocoons. Physico-chemical characteristics of soil and plant were also studied to assess the effects of oil exploration on Muga (*Antheraea assama*) silk worms. Principal component analysis
of hydrocarbons in soil and leaves showed different clusters during pre-monsoon and post-monsoon periods. SEM and protein analyses of the *A. assama* silk fibre produced in the oil field area have exhibited the deteriorating quality of the silk. Detection of some of the metals present in PM2.5, soil and leaves of *Machilus bombycina* plantation above the permissible limit indicated the decline production of *Antheraea assama*. From this study it can be inferred that in oil field area to a certain extent the surrounding area is heavily contaminated by heavy metals and petroleum hydrocarbons which may cause detrimental effect on health of human being also.