Wet Deposition Fluxes of Nitrate and Ammonium at a Rural Agricultural Site in northern India

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The chemical composition of rainwater is an indicator of the air quality and sources of influence. In this study, pH and ionic concentrations were measured in rain samples collected during the monsoon season of 2018 at a rural agricultural site located in northern part of India. Wet deposition fluxes of reactive nitrogen species NH$_4^+$ over NO$_3^-$ were calculated to estimate their annual deposition. The pH of samples varied between 5.2 and 6.14, with an average value of 5.72 which is in alkaline range considering 5.6 as the neutral pH of cloud water with atmospheric CO$_2$ equilibrium. These relatively high pH values indicate the neutralisation of acidity in precipitation. Samples were analysed for their cationic and anionic content using ion chromatography. The results showed that NH$_4^+$ concentrations were higher than NO$_3^-$ with the VWM concentrations of 187.23 μeq l$^{-1}$ and 26.79 μeq l$^{-1}$ respectively. Furthermore, wet deposition flux of NH$_4^+$-N was calculated as 4.25 kg ha$^{-1}$ yr$^{-1}$ while that of NO$_3^-$-N was as 2.10 kg ha$^{-1}$ yr$^{-1}$. VWM concentrations of major ions decreased in the following order NH$_4^+$ > Ca$^{2+}$ > SO$_4^{2-}$ > NO$_3^-$ > K$^+$ > Cl$^-$ > Na$^+$ > Mg$^{2+}$. In this study, relatively high NH$_4^+$ concentrations in rainwater can be attributed to nearby agricultural activities, excreta and biomass burning.

Keywords: Rainwater, Neutralisation, VWM concentration, Agricultural site, Reactive Nitrogen.