

Nitrogen Inputs by Precipitation in the Nigerian Savanna

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Abstract

Inorganic nitrogen input *via* direct bulk precipitation was measured, and the relation between the different nitrogen species and rainfall characteristics determined over three rainy seasons at Shagunu, a remote, sparsely populated, non-industrialized site in the northern Guinea savanna of Nigeria. Nitrogen concentration per event rain varied very widely ($\text{NH}_4^+\text{-N} = 0 - 3738 \mu\text{g dm}^{-3}$, $\text{NO}_3^-\text{-N} = 0 - 5389 \mu\text{g dm}^{-3}$) with amount-weighted mean values of $269 \mu\text{g dm}^{-3} \text{NH}_4^+\text{-N}$ and $76 \mu\text{g dm}^{-3} \text{NO}_3^-\text{-N}$, and a positively skewed frequency distribution for each species. The mean annual total nitrogen deposition of 3.3 kg ha^{-1} (range = $2.85\text{--}3.47 \text{ kg ha}^{-1}$) comprised of 79% $\text{NH}_4^+\text{-N}$ and 21% $\text{NO}_3^-\text{-N}$. This is about 12% of the estimated total nitrogen input into the Nigerian grazing savanna and 25% of the estimated nitrogen loss from it through annual bush burning. Compared with the available records for West Africa the mean average input is rather low; it is similar with figures for the remote parts of the world with little or no anthropogenic contribution. All probable accounts pointed to a low nitrogen background, relatively low annual precipitation (due to a peculiar topographic effect on the study site) and the fact that rain water nitrogen was predominantly of terrestrial origin. Monographs for the estimation of $\text{NO}_3^-\text{-N}$ concentrations from the amount of event rainfall through the rainy season were provided. Multiple regression equations for the estimation of nitrogen inputs in West Africa from rainfall amount, latitudinal position, and distance away from the sea were also provided.