Geophysical Research Abstracts
Vol. 13, EGU2011-13161, 2011
EGU General Assembly 2011

Fractionation of organic phosphorus and its distribution in profile soils of Yeyahu Wetland in Beijing, China

Min Li (1), Jin Zhang (1), Shuang Liu (1), Qi Cao (1), Sue White (2), and Michael Whelan (2)

(1) College of Environmental Science and Engineering, Beijing Forestry University, Beijing, P. R. China, 100083 (min.li@cranfield.ac.uk), (2) School of Applied Sciences, Cranfield University, Bedfordshire, MK43 0AL, UK

The Yeyahu Wetland Nature Reserve (40˚22′04?N to 40˚30′31? N; 115˚46′16?E to 115˚59′48? E) is situated in the northwest of Yanqing County in Beijing, China. The wetland is the largest in the Beijing area and is dominated by mudflats, reservoir ponds and marshes. These components are linked together by the Guishui River. The wetland receives contaminated water from domestic sewage and garbage, limited industrial pollution, agricultural nonpoint pollution and sediment from soil erosion. Making long-term improvements in water quality in the wetland depends on the reduction of P inputs from the atmosphere, influent rivers and runoff.

Organic phosphorus (OP) plays an important role in soil biogeochemical cycles and is a potential source of P for the productivity of the wetland. Different OP fractions must be extracted from soils before analysis, which is subject to the chemical solubility of fractions in extractants. The aim of this study was to investigate the OP form, composition and bioavailability in soils within the Yeyahu Wetland using an appropriate method of OP fractionation. A sequential extraction scheme was modified from Bowman and Cole (1978), Ivanoff et al. (1998) and Fisher (2007) in order to increase extraction efficiency by changing shaking time, pH in the acidifying procedure (pH$<$2) and combustion time in the determination of residual OP.

The results show that total OP ranging from 5.0% to 59.6% with an average of 22.6% of TP were more abundant in upper layers of soils. The concentration rank order of different OP fractions was as follows: highly resistant OP $>$ moderately labile OP $>$ moderately resistant OP $>$ labile OP. These fractions accounted for 2.1-41.1%, 8.4-14.1%, 0.9-8.4% and 0.25-2.8% of TP, respectively. Different OP fractions were all positively correlated with TP, moisture content and organic matter. It can be seen that organic matter contributed significantly to the content of different OP fractions in soils. The negative but significant correlation between pH and OP fractions indicates that pH was one of the important factors to the content of OP fractions in soils. Moderately labile OP accounting for a larger ratio of total OP and it was positively correlated with soil clay and silt contents. Meanwhile, it showed an apparently negative correlation with soil sand contents.

As a result, attention should be paid to OP as a potential portion of the bioavailable P in soils, particularly in the native alkaline and neutral soils of Yeyahu Wetland. Future studies should evaluate the structural composition of OP fractions using effective ^{31}P NMR spectroscopy in order to support the conclusions derived from sequential extraction procedures.