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Editorial

Emission of N_2O Gas from Arable Lands: Relation with Soil pH

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Climate change is a threat to the sustainable development, and changes in the climate have been noticed since the early 1950s. Atmospheric greenhouse gas (GHG) concentrations have increased significantly in the last three decades. Soils and fossil fuels are the main sources of GHGs in the atmosphere and nitrous oxide (N_2O) is one of the most important greenhouse gases since it has long lifetime (about 114 yrs), high global warming potential and ability to destroy ozone (O_3) layer.

Agricultural activities, including the extensive use of organic and inorganic nitrogen (N) fertilizers, have contributed to the increased emissions of N_2O to the atmosphere. Application of N fertilizers to soils provides surplus ammonium (NH_4^+-N) and nitrate (NO_3^--N) which can undergo transformation via microbial nitrification and denitrification processes leading to N_2O emissions. The excessive use of N fertilizers also generates H^+ concentrations creating soil acidification. Annually, about 20 to 33 kmol H^+ ha^{-1} is generated in intensive cropping areas through the excessive use of N-based fertilizers. Agricultural soils are becoming acidic worldwide in intensive farming systems due to high application rates of N fertilizers. Approximately, 30% of ice-free land worldwide is under the influence of acidification. Soil acidification is a major problem for crop growth and different techniques are recommended to counteract the problem of soil acidification, including acid tolerant crop varieties, balanced and appropriate use of fertilizers, and the application of lime and dolomite.

Application of lime is recommended in agricultural soils for amelioration of acidity. Increasing soil pH following lime application can accelerate the nitrification process and reduces the chance of NH_4^+-N uptake by plants since many plants prefer NH_4^+-N to NO_3^--N. Applications of lime can also decrease N2O emissions through a variety of mechanisms in soil. Recently, it has been illustrated that N_2O emissions are decreased at higher pH levels by enhancement of N_2O reductase enzyme following lime application. Application of lime in acidic soils is presenting tremendous results of decreasing N_2O emissions from arable lands of low pH and attracting scientists and researchers for its advancement at global level in order to minimize the adverse effects of climate change and global warming [1-4].

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