
Acidification as a controlling factor for the content of active forms of nutrients in soil

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The effects of soil acidification on the content of nutrients in active form ($\text{NH}_4\text{-N}$, $\text{NO}_3\text{-N}$, $\text{PO}_4\text{-P}$, Ca^{2+} , Mg^{2+} , Zn^{2+}) in soil was studied in a laboratory experiment. The soil samples were taken from four different soils. The experimental unit was 250 g of soil samples. Different values of pH (pH: 3.5 – 7.5) were simulated by the addition of NaOH and HCl, as well as by maintaining a 60% full water volume for six months. After incubation, single-time nutrients extraction was carried out by a one-hour agitation of the soil material with redistilled water, at a ratio of 1 to 10 (soil to water). The soil-water mixture was filtered under pressure, and the contents of $\text{NH}_4\text{-N}$, $\text{NO}_3\text{-N}$, $\text{PO}_4\text{-P}$, K^+ , Ca^{2+} , Mg^{2+} and Zn^{2+} were measured in the received solution.

The assumption was that the active form of nutrient is most sensitive for leaching in the case of adequate water flow through the soil profile. The content of $\text{NO}_3\text{-N}$ in the soil was decreased significantly as acidification increased. In contrast, the content of $\text{NH}_4\text{-N}$ was increased at the same time. It was probably connected with the limitation of nitrification efficiency (Haynes and Swift 1986, Robson and Abbott 1989). The maximum contents of $\text{NH}_4\text{-N}$, K^+ , Ca^+ , Mg^+ and Zn^+ , were extracted from pH 3.5 treatments; however, minimum contents were extracted from pH 7.5 treatments. There is probably the mechanism of exchangeable cations (NH_4^+ , K^+ , Ca^{2+} , Mg^{2+} , Zn^{2+}) displacing from sorption complex by H^+ and Al^{3+} ions (Goulding and Blake 1988, Hartikainen 1996). The highest content of $\text{PO}_4\text{-P}$ in the soil was noticed in pH 6 and 7 treatments; and was probably caused by phosphorus immobilisation to insoluble compounds at pH 5.5 above. (Addiscott and Thomas 2000).

References

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