ECOLOGICAL CHEMISTRY AND ENGINEERING A

Vol. 16, No. 8 2009

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EFFECT OF COMPOST, BENTONITE, ZEOLITE AND CALCIUM OXIDE ON MINERAL NITROGEN CONTENT IN NICKEL CONTAMINATED SOIL

WPŁYW KOMPOSTU, BENTONITU, ZEOLITU I TLENKU WAPNIA NA ZAWARTOŚĆ AZOTU MINERALNEGO W GLEBIE ZANIECZYSZCZONEJ NIKLEM

Abstract: The purpose of this study has been to determine the effect of compost, bentonite, zeolite and calcium oxide on the concentration of nitrogen in nickel contaminated soil (0, 100, 200 and 300 mg Ni · kg^{-1} of soil). The level of mineral nitrogen in soil depended on the soil contamination with nickel, addition of pollution neutralizing substances and crop species. The effect of nickel on the content of mineral nitrogen in soil was closely connected with the crop species. In the series of trials without substances alleviating nickel contamination, the metal pollution depressed the share and content of $N\text{-}NO_3^-$ in mineral nitrogen in soil under oats, but raised its concentration and percentage in soil under yellow lupine. The effect of nickel was much stronger in soil under yellow lupine than under oats. Nickel had an adverse effect on the content of $N\text{-}NH_4^+$ in soil under yellow lupine. Application of bentonite, zeolite and calcium oxide limited the content of ammonia nitrogen in soil, as compared with the average concentration from the unamended series. Bentonite had the strongest effect on the content of $N\text{-}NH_4^+$ in soil under oats, while in soil under yellow lupine zeolite and calcium oxide were the most effective. The neutralising substances added to soil had a contrary influence on the content of nitrate(V) nitrogen when compared with that produced on ammonia nitrogen. They all favoured increased concentration of this form of nitrogen in soil. The strongest effect on the average content of $N\text{-}NO_3^-$ was produced by bentonite. Bentonite, zeolite and calcium oxide resulted in increased ratios of nitrate nitrogen in total mineral nitrogen in soil, with bentonite producing a stronger effect in soil under oats while zeolite and calcium oxide being more effective in soil under yellow lupine. Zeolite and calcium oxide had a stronger effect on the ratio of $N\text{-}NO_3^-$ in soil under yellow lupine than in soil under oats. Compost produced similar results, but only in soil under yellow lupine.

Keywords: contamination, nickel, compost, bentonite, zeolite, calcium oxide, soil, mineral nitrogen