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Influence of propanil on soil nitrogen mineralization as affected by the rate of application

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Despite the beneficial impact on improving agricultural productivity, the potential dangers of soil contamination with toxic substances has stimulated researchers to investigate the detrimental effects of herbicides on soil microbial activity. Propanil, one of the commonly used post-emergence herbicide, was selected in this study to determine the effect of its rate of application on nitrogen mineralization.

Soil used for the study belongs to the Red Yellow Podzolic great soil group (Rhodustult). The experiment consisted of three propanil treatments (i.e. 0.0224, 0.224 and 2.24 $\mu\text{g/g}$ soil) with a control. Determination of NH_4^+ - N and NO_3^- - N were carried out at 1, 3, 5, 7, 14, 21 and 35 days after herbicide application. A Completely Randomized Design (CRD) with four replicates was used. Results revealed that the NH_4^+ - N contents are not affected significantly ($P \leq 0.05$) when propanil was applied at the rates of 0.0224 and 0.224 $\mu\text{g/g}$ soil. However, it was observed that the release of NH_4^+ - N becomes significant ($P \leq 0.05$) compared to the control when the application rate was increased up to 2.24 $\mu\text{g/g}$ soil. In the case of NO_3^- - N, no distinct pattern of treatment behavior could be observed except for 2.24 $\mu\text{g/g}$ soil, which differed significantly ($P \leq 0.05$) from the control, whereas, in the control, almost constant NO_3^- - N level could be seen throughout the incubation.

Propanil has influenced positively on ammonification at all the application rates, in spite of slight inhibition shown at the early stages. As far as nitrification is concerned, propanil showed no significant ($P \leq 0.05$) difference of stimulatory or inhibitory effects. Therefore, it could be concluded that as nitrification was less affected by propanil even at higher rates, careful application of recommended rates of propanil on Red Yellow Podzolic soils would not be harmful on microbial processes involved in nitrogen mineralization.