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Monitoring of inorganic nitrogen in surface and groundwater at the intensive farming villages of the Red River Delta, Viet Nam

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Abstract: The quality of surface water (canal and pond water) and groundwater (well water) was monitored with an interval of 6 months from 2002 to 2005 at two farming villages near Ha Noi, Viet Nam. In the villages, two rice and one winter crop were cultivated within a year, in which massive amounts of chemical fertilizer-N were applied consecutively. The ammonium-N concentration ranged from 0.01 to 11.6 mg/L for surface water and from trace level to 5.6 mg/L for groundwater. The nitrate-N concentration ranged from 0.04 to 0.95 mg/L for surface water and from 0.01 to 1.2 mg/L for groundwater. These concentrations did not increase with time. It was considered that surface water must be carefully used for the irrigation of agricultural crops, because the ammonium-N plus nitrate-N concentration exceeded a threshold value of 5 mg/L at several times during the monitoring period, above which some damage for crop growth might happen. The ammonium-N concentration of groundwater was proportional to the annual amount of chemical fertilizer-N applied at the villages, suggesting a positive effect of the application of chemical fertilizer-N on an ammonium-N concentration of groundwater. Groundwater was unsuitable for drinking, because the ammonium-N concentrations mostly exceeded a level of 0.78 mg/L, above which human internal organ systems might be damaged. The nitrate-N concentration of groundwater satisfied the water standard for drinking use.

Keywords: Ammonium-N, Chemical fertilizer, Farming village, Nitrate-N, Water quality

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