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Effect of Different Nitrogen Fertilizer Types and Application Measures on Temporal and Spatial Variation of Soil Nitrate-Nitrogen at Cucumber Field

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ABSTRACT

Nitrate-nitrogen content of groundwater are ever-increasing in underneath vegetable growing areas, in this paper, based on field test of cucumber cultivated in Solar Greenhouse in North China, we study the effects of different nitrogen fertilizer application levels (250, 300, 350kg/hm^2) and different nitrogen fertilizer types (urea, urea + nitrification inhibitor, slow-release fertilizer) on temporal and spatial variation of soil nitrate-nitrogen content in different soil depth, soil nitrogen fertilizer retention and nitrogen use efficiency during cucumber growth period. The results show that, in the cases of nitrogen fertilizer types (urea and urea + nitrification inhibitor), for surface soil (0 - 40 cm soil depth), the temporal trend of soil nitrate-nitrogen content variation is similar: during the early stage of cucumber growth, soil nitrate-nitrogen content is relatively high; during the middle stage of cucumber growth, as nitrogen is constantly being absorbed by the vegetable, soil nitrate-nitrogen content decrease; during the late stage of cucumber growth, soil nitrate-nitrogen content increase, and increase more significantly when nitrification inhibitor is added in the fertilizer. For deep soil layer (40 - 100 cm depth), when only using urea, the temporal trend of soil nitrate-nitrogen content variation is that of continuous increase, when adding nitrification inhibitor, the temporal trend of soil nitrate-nitrogen content variation is that of insignificant increase. In the case of slow-release fertilizer, for both surface soil and deep soil layer, the temporal trend of soil nitrate-nitrogen content variation is that of continuous decrease. For all three types of nitrogen fertilizer, as fertilization level increase, soil nitrate-nitrogen content in various soil layers increase with it. In the case of fertilization at 300 kg/hm^2 and 350 kg/hm^2, adding nitrification inhibitor can increase soil retention of nitrogen fertilizer. This study suggests that adding nitrification inhibitors can increase soil retention of nitrogen fertilizer, decrease nitrate-nitrogen leaching downward, thereby reducing the pollution to groundwater.

KEYWORDS

Solar Greenhouse; Cucumber; Nitrate-Nitrogen; Nitrogen Retention

Cite this paper

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