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# 不同施氮水平对深层包气带土壤氮素淋溶累积的影响

# Effects of different chemical nitrogenous fertilizer application rates on soil nitrogen leaching and accumulation in deep vadose zone

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| 作者 | 单位 |
| --- | --- |
| 商放泽 | 1.中国农业大学水利与土木工程学院，北京 100083 |
| 杨培岭 | 1.中国农业大学水利与土木工程学院，北京 100083 |
| 李云开 | 1.中国农业大学水利与土木工程学院，北京 100083 |
| 任树梅 | 1.中国农业大学水利与土木工程学院，北京 100083 |
| 刘培斌 | 2.北京市水利规划设计研究院，北京 100048 |
| 贺国平 | 2.北京市水利规划设计研究院，北京 100048 |



中文摘要:

为研究深层包气带土壤中氮素的迁移规律，采用田间小区试验，研究了不同施氮水平(142.5、285和427.5 kg/hm2)对夏玉米种植期间0～500 cm包气带土壤中氮素淋溶累积的影响。结果表明，不同施氮水平对NO3--N、NH4+-N和总氮有显著影响，施氮越多，NO3--N、NH4+-N和总氮在土壤中的淋溶累积也就越多，夏玉米生育期间土壤中氮素的淋溶累积含量随着夏玉米生长逐渐减少。在0～200 cm土层中，收获后不同施肥水平土壤中NO3--N和总氮累积量随施氮量增加而增多，285 kg/hm2施氮水平NH4+-N累积量最多，427.5 kg/hm2施氮水平NH4+-N累积量最少，但相差不超过0.1 kg/hm2，收获后土壤中氮素累积量有损失。夏玉米生育期间不同施氮水平对土壤NO3--N、NH4+-N和总氮的影响深度主要为0～145 cm。粉砂壤土中氮素更易累积，砂质壤土中氮素较易随水分淋溶至下层。142.5 kg/hm2施氮水平可有效减少NO3--N在土壤中的淋溶损失，降低土壤中NH4+-N和总氮的含量，对地下水构成的潜在污染风险最小。北京地区地下水埋深较深，NO3--N不易淋溶至地下水，但长期大量施用氮肥、田间土壤大孔隙的存在等会加速NO3--N向深层土壤迁移，对地下水水质构成威胁。

英文摘要:

In order to study the soil nitrogen migration under different application rates of chemical nitrogenous fertilizer in deep vadose zone, during the course of summer maize growing, 3 chemical N fertilizer levels (142.5, 285 and 427.5 kg/hm2) were set up, the NO3--N, NH4+-N and total nitrogen migration and accumulation in the first 500 cm depth of soil for each treatment were studied. The results showed that impacts of chemical N application rates on NO3--N, NH4+-N and total nitrogen were dramatic, the leaching and accumulation of soil NO3--N, NH4+-N and total nitrogen increased with increasing chemical N application rate, but decreased with the growth of summer maize. Soil NO3--N and total nitrogen accumulation increased with the increase of chemical N application rate in 0-200 cm soil, while the soil NH4+-N accumulation were found to be in the following descending order: the 285 kg/hm2 N application rate> the 142.5 kg/hm2 N application rate> the 427.5 kg/hm2 N application rate, but the difference was no more than 0.1 kg/hm2. After harvest the soil nitrogen accumulation decreased. The influences of different N application rates on soil NO3--N, NH4+-N and total nitrogen changes were mainly in 0-145 cm depth. The soil nitrogen was inclined to accumulate in powder sandy loam and leach into water in sandy loam. The 142.5 kg/hm2 N application rate can effectively reduce the NO3--N leaching, and reduce NH4+-N and total nitrogen content in soil, thus make the risk of groundwater pollution minimum. The groundwater in Beijing is deep, which is not polluted easily by NO3--N leaching. However, large quantity of chemical N application in long-term and the presence of soil macropores can accelerate the leaching and migration of NO3--N in the soils, thus posing a threat to groundwater quality in the Beijing area.

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