

## 夏玉米生长期黄淮海平原土壤水氮利用效率模拟分析

### Simulation and analysis of soil water and nitrogen behaviors in Huang-Huai-Hai Plain in summer-maize growing season

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英文关键词: Huang-Huai-Hai plain; water use efficiency; nitrogen use efficiency; simulation; geographic information system

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中文摘要:

以黄淮海平原为研究区域, 建立并验证了基于地理信息系统(GIS)的土壤水、热、氮和作物生长联合模型。在1999年黄淮海平原的农村社会经济条件和土壤、气候等条件背景下, 运用基于GIS的联合模型对夏玉米生长期土壤水氮利用效率和氮素损失量的区域分布规律进行评价。结果表明, 由于自然条件和农田管理措施的差异, 水分利用效率(WUE)、氮素利用效率(NUE)及土壤氮素淋失情况的空间分布在各地地貌区划区之间有明显差异。多元线性逐步回归分析表明: 1 m土体的氮素淋失量与施氮量、饱和导水率(Ks)、积温、降水和灌水量均呈极显著的正相关; WUE与施氮量呈极显著的正相关, 而与积温呈极显著的负相关; NUE与降水和灌水量呈极显著的正相关, 而与施氮量和土壤有机质含量呈极显著的负相关。

英文摘要:

The Huang-Huai-Hai Plain(HHHP) was selected as the research region of this paper. A geographic information system based conjunctive simulation model incorporating soil water, heat, nitrogen behaviors and crop growth was established and validated. The regional distributions of water and nitrogen use efficiency (WUE and NUE), and nitrogen loss were studied under the soil, meteorological and rural socio-economical condition of HHHP in 1999 by the GIS-based model. The results show that, due to the variations in biophysical conditions and farming practices, the inter-physiognomy variations on WUE, NUE as well as soil nitrogen leaching has exhibited significant differences. The multivariate stepwise regression results show that in summer-maize growing season, nitrogen leaching was significantly positively correlated with nitrogen fertilizer applied(NFA), saturated hydraulic conductivity(Ks), Active accumulated temperature(ACT), rainfall and irrigation amount(RIA). WUE was significantly positively correlated with NFA and significantly negatively correlated with ACT. NUE was significantly positively correlated with RIA and significantly negatively relative with NFA and soil organic matter(SOM).

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