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汉江上游主要农作物氮肥投入特点及土壤养分负荷分析

Analysis of nitrogen inputs and soil nutrient loading in different croplands in the upper Hangjiang River

关键词：汉江上游 氮肥投入 氮素盈余 土壤养分 负荷分析

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摘要： 为了解汉江上游主要农作物氮肥投入特点及土壤养分现状,加强汉江上游农业面源污染管理,指导农户科学合理施肥,保障汉江源头水质安全.以汉江上游汉中段沿河岸土壤养分分析、农户施肥调查等统计数据为基础,采用盈余法从作物种类分析种植生产体系中氮素输入输出特点及土壤氮素盈余状况.结果表明,汉江上游主要农作物平均化肥氮投入量为173.9 kg·hm^{-2}(以N计,下同),通过有机肥投入的氮远远小于化肥氮,仅为7.2 kg·hm^{-2}.84.0%的农田氮素样本处于盈余,总体平均盈余量为77.4 kg·hm^{-2},其中,盈余量超过100 kg·hm^{-2}的样本亦占了40.8%.但养分投入不足表现为氮养分亏缺的样本也占调查样本的16.0%.不同作物比较,水稻田氮肥投入量为202.2 kg·hm^{-2},高于油菜地施肥量159.9 kg·hm^{-2}.而水稻收获时籽粒和茎叶的氮带出量为197.1 kg·hm^{-2},高于油菜收获时的带出量103.5 kg·hm^{-2},因此,水稻田氮盈余量(20.72 kg·hm^{-2})低于油菜地(72.02 kg·hm^{-2}).调查区土壤养分表现为氮、钾丰富,有机质、有效磷含量低于全国及南方水稻、油菜主产地水平.汉江上游主要农作物不合理的氮肥投入特点给土壤环境带来较大的氮素负荷,长期以往将给土壤环境和汉江上游水体造成很大威胁.

Abstract：Accurate information about current soil nutrient concentrations in croplands is required for making recommendations on fertilizer application in future. The amount of soil N surplus in the croplands of upper Hanjiang river, which is the main rice and rape production region in Shaanxi Province, needs to be investigated since the N inputs and soil nutrients loading is important for environmental protection in this region. The objective of this study was to quantify both the N application rates and the amount of soil N surplus in croplands in the upper Hanjiang river. Soil samples were collected from croplands in different parts of farmlands and analyzed to determine soil nutrients concentration (organic matter, N, P and K). Additional information was collected from farmer surveys and an agricultural statistics database. The data was analyzed using the N balance method. The results revealed that the average N fertilizer application rates among the croplands surveyed was 173.9 kg·hm^{-2} in this study. Manure application accounted for only 7.2 kg·hm^{-2}. Nearly 84.0% of croplands were in a situation of N surplus, with an average of 77.4 kg·hm^{-2}. Around 40.8% of croplands showed an N surplus of more than 100 kg·hm^{-2}. In contrast, N in nearly 16.0% of farmland was deficient. In different types of croplands, the rice fields had a higher N input rate (202.2 kg·hm^{-2}) but a lower amount of surplus N (20.72 kg·hm^{-2}) compared with the rape fields, due to a higher amount of removal N (197.1 kg·hm^{-2}) at the time of harvest. In the investigated region, the available N and K were rich in 0~20 cm soil depth, and the organic matter and available P were generally below the national average. High N inputs to croplands in the upper Hanjiang river led to high soil N loading, which would in the long term increase environmental risks in the region.

Key words：the upper Hanjing River nitrogen input nitrogen surplus soil nutrient loading analysis

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