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上海市浦东农业区降水氮浓度的时间分布

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Temporal Distribution of Nitrogen in Precipitation in Agricultural Zone, Pudong, Shanghai

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摘要 于2008年在上海市浦东农业区设置采样点按月收集降水样品,测定降水 NO_3^- -N和 NH_4^+ -N浓度,分析氮浓度的变化规律及其影响因素,并计算氮沉降通量。结果表明,浦东农业区降水氮浓度和年沉降通量均较高, $\rho(\text{NO}_3^-$ -N)平均值为 $0.44\text{mg}\cdot\text{L}^{-1}$,年沉降通量为 $5.19\text{kg}\cdot\text{hm}^{-2}\cdot\text{a}^{-1}$; $\rho(\text{NH}_4^+$ -N)平均值为 $1.36\text{mg}\cdot\text{L}^{-1}$,年沉降通量为 $15.91\text{kg}\cdot\text{hm}^{-2}\cdot\text{a}^{-1}$; TN年沉降通量为 $21.10\text{kg}\cdot\text{hm}^{-2}\cdot\text{a}^{-1}$,其中 NH_4^+ -N占75.4%。降水 NO_3^- -N和 NH_4^+ -N浓度在主要生长季(4-10月)低于非主要生长季(11月至次年3月);而 NH_4^+ -N沉降量在主要生长季高于非主要生长季, NO_3^- -N沉降量在主要生长季和非主要生长季差异较小,这主要是人为活动、降水日数与降水量以及风向等因素的综合作用所致。降水氮输入对研究区初级生产力的提高具有积极意义,但降雨氮浓度已超过水体富营养化阈值,可能加剧农业区内水体富营养化。

关键词: 降水 氮 沉降通量 浦东农业区 上海

Abstract: In order to investigate change in nitrogen concentration in precipitation in the agricultural zone of Pudong, Shanghai, its law and affecting factors, and N deposition flux, rains were sampled monthly over a year (2008) for analysis of nitrate (NO_3^- -N) and ammonia nitrogen (NH_4^+ -N) concentrations. Results show that nitrogen concentration in rain water and annual N deposition flux were both quite high in the zone, with the mean concentration of NO_3^- -N being $0.44\text{mg}\cdot\text{L}^{-1}$ and of N being $1.36\text{mg}\cdot\text{L}^{-1}$, and the annual deposition flux of NO_3^- -N being $5.19\text{kg}\cdot\text{hm}^{-2}\cdot\text{a}^{-1}$ and of NH_4^+ -N, being $15.91\text{kg}\cdot\text{hm}^{-2}\cdot\text{a}^{-1}$, making the annual deposition flux of TN up to $21.10\text{kg}\cdot\text{hm}^{-2}\cdot\text{a}^{-1}$, of which NH_4^+ -N accounted for 75.4%. The concentrations of NO_3^- -N and NH_4^+ -N in rain water were lower in the main growing season (April-October) than in the main non-growing season (November-March). However, in terms of deposition flux, NH_4^+ -N was higher in the former than in the latter, while NO_3^- -N did not differ much between the two, which was attributed to the comprehensive effect of human activities, number of raining days, rainfall, wind direction, etc.. Generally speaking, the nitrogen input with precipitation is of some positive significance to the primary productivity in the study zone, the nitrogen concentrations in rainfall have exceeded the threshold value of water eutrophication, which may intensify eutrophication of the aquatic systems in the zone.

Keywords: precipitation nitrogen deposition flux Pudong agricultural zone Shanghai

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