

特别专题:江湖关系变化及其对鄱阳湖水环境影响研究

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鄱阳湖水体颗粒物对3种典型藻类的生长及絮凝作用

The effect of suspended particulates in Poyang Lake on the growth and flocculation of three kinds of algae

关键词: [水体颗粒物](#) [藻类](#) [粒径](#) [浓度](#) [pH](#) [絮凝沉降效率](#)

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摘要: 研究了鄱阳湖水体颗粒物对3种典型藻类的生长及絮凝作用。以铜绿微囊藻(蓝藻)、四尾栅藻(绿藻)和菱形藻(硅藻)为研究对象,鄱阳湖采集沉积物为悬浮颗粒物,利用500 mL玻璃锥形瓶作为小型、光照均一体系,于此体系中研究了颗粒物对藻类生长的影响,使用湿凝试验搅拌机分别研究了颗粒物粒径、浓度和体系pH对颗粒物絮凝沉降细胞的影响。在小型光照均一体系中,20 mg·L⁻¹(鄱阳湖悬浮颗粒物低浓度)和80 mg·L⁻¹(鄱阳湖悬浮颗粒物高浓度)颗粒物对3种藻类的生长影响均较小。在颗粒物投加量为0.02 g·L⁻¹时,60~300目颗粒物均促进藻类的絮凝沉降,并且随着颗粒物粒径(D₅₀)的增大,藻细胞的絮凝沉降效率逐渐减小,而且粒径在1~25 μm部分的颗粒在此过程中占主导地位。当颗粒物投加量由0.02 g·L⁻¹升至1.28 g·L⁻¹时,3种藻的絮凝沉降效率随之提高。在颗粒物投加量为0.02 g·L⁻¹时,铜绿微囊藻、四尾栅藻和菱形藻的絮凝沉降效率分别为11.08%、15.87%和7.50%,当颗粒物浓度升至1.28 g·L⁻¹时,3种藻的絮凝沉降效率分别达42.33%、41.72%、28.98%。在pH值6~10范围内,随着pH升高,颗粒物对蓝藻、绿藻的絮凝沉降作用逐渐减小,絮凝沉降效率分别从pH为6时的36.10%、35.07%降到pH为10时的16.25%、12.59%;而对硅藻的絮凝沉降作用不明显。由此可见,鄱阳湖水体颗粒物影响藻类的絮凝沉降过程,使藻类的群落结构发生变化。

Abstract: The effects of suspended particles in Poyang Lake on the growth and flocculation of three kinds of typical algae were studied. The algae, such as *Microcystis aeruginosa* (cyanobacteria), *Scenedesmus quadricauda* (green algae) and *Nitzschia* (diatoms), and sediments collected in Poyang Lake were used to conduct the experiments, which includes the effect of suspended particulates on the algae growth, and the effect of size, concentration and pH of the suspended matrix on the flocculation-sedimentation efficiency of algae cells. The tested concentrations of 20 mg·L⁻¹ (low in Poyang Lake) and 80 mg·L⁻¹ (high in Poyang Lake) of particles slightly influenced the growth of three kinds of algae cells. The jar test results show that 0.02 g·L⁻¹ particulates with the size of 60-300 meshes could enhance the flocculation-sedimentation efficiency, which gradually decreased with the increase of particulate size in terms of D₅₀. It can also be observed that the particulates size in 1~25 μm dominated the flocculation-settlement process. Moreover, the flocculation-sedimentation efficiency of these three kinds of algae increased as the dosage increased from 0.02 g·L⁻¹ to 1.28 g·L⁻¹. At the lower dosage, the removal efficiencies for *Microcystis aeruginosa*, *Scenedesmus quadricauda* and *Nitzschia* were only 11.08%, 15.87% and 7.5%; at the higher one, the removal efficiencies increased up to 42.33%, 41.72% and 28.98%, respectively. With the rise of pH from 6.0 to 10.0, the flocculation-settlement efficiency of cyanobacteria or green algae gradually decreased from 36.10% or 35.07% to 16.25% or 12.59%, while pH had little effect on diatoms. It can be seen that suspended particulates in Poyang Lake can influence the flocculation-settlement process of algae, which also caused the change of algae community structure.

Key words: [suspended particles in waterbody](#) [algae](#) [particle size](#) [concentration](#) [pH](#) [flocculation-sedimentation efficiency](#)

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