

低功率高频超声抑制蓝藻生长的研究

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为防治蓝藻水华,从超声的生物效应出发提出了新的抑藻思路。低功率高频(1.7 MHz)超声高效节能地破坏藻胆体和叶绿素等蓝藻天线复合物的关键组分,或抑制其生物合成,导致光合作用受阻,从而抑制蓝藻生长。在钝顶螺旋藻对照实验中,5 min超声辐照为最佳处理时间,可显著降低蓝藻浓度,并使其生长速度大大减缓。实验发现藻蓝蛋白受到的超声破坏作用尤其强烈,即高频超声对蓝藻细胞不同成分的破坏具有选择性,据此提出了高频超声量子效应的解释。

STUDIES ON THE INHIBITION OF CYANOBACTERIA'S GROWTH BY LOW-POWER AND HIGH-FREQUENCY ULTRASOUND

To prevent water bloom, a new method of inhibiting cyanobacteria's growth was presented based on the bio-effect of ultrasound. The key components of antenna complexes, such as phycobilisome and chlorophyll, are damaged or biosynthetically inhibited by low-power and high-frequency (1.7 MHz) ultrasound efficiently and energy-savings, so the photosynthesis is restrained and cyanobacteria's growth is inhibited. In the experiments with *Spirulina platensis*, after the most economic and effective ultrasonic irradiation of 5 min, the concentration was decreased obviously and the rate of growth was slowed down greatly. It was found that phycocyanin was damaged intensely in the experiments, i.e., a selective damage of high-frequency ultrasound on different cell components was found. The explanation was presented based on the quantum effect of high-frequency ultrasound.

关键词

蓝藻(Cyanobacteria); 高频超声(High-frequency ultrasound); 藻蓝蛋白(Phycocyanin); 叶绿素(Chlorophyll); 光合作用(Photosynthesis)