

研究论文

## 基于CCA的典型调水水库浮游植物群落动态特征分析

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**摘要** 调水水库是一类特殊的水体, 其浮游植物群落的组成与动态的调节机制与其它水库存在较大的差别。为了解这类水库浮游植物群落的特征, 于2005年1月~12月, 对位于广东省珠海市的调水型供水水库——大镜山水库的浮游植物和相关的理化因子进行了2周1次的采样。全年共检测到浮游植物100种(属); 浮游植物丰度在 $0.86 \sim 106.27 \times 10^6 \text{cells} \cdot \text{L}^{-1}$ 之间, 生物量在 $1.08 \sim 20.45 \text{mg} \cdot \text{L}^{-1}$ 之间变化; 全年以假鱼腥藻(*Pseudanabaena* sp.)为主要优势藻, 肘状针杆藻(*Synedra ulna*)在冬春为次优势藻, 浮游植物群落相对比较稳定。运用典范对应分析(CCA)方法对浮游植物群落的组成及动态与环境因子之间的关系进行了分析和探讨。样品(cases)的CCA分析表明, 全部的样品分布在主轴1和主轴2构成的4个象限内, 与四季相对应, 样品在4个象限的分布并不均匀, 反映了热带水库所处的气候四季不分明特点, 冬春季很短, 夏秋季较长, 但夏秋与冬春有较为明显的分割; 蓝藻门、裸藻门和硅藻门的藻类主要分布在夏、秋季所对应的象限内, 而绿藻门的大部分, 金藻门和隐藻门的藻类分布在冬、春季所对应的象限内。水温和降雨量是大镜山水库浮游植物群落结构动态的主要驱动因子, 降雨量不仅影响水库水位, 同时直接影响调水量和入库的营养盐负荷。

**关键词** 浮游植物 环境因子 典范对应分析 调水水库

分类号 [Q178, Q948.8](#)

## Structure and dynamics of phytoplankton community based CCA analysis in a pumped storage reservoir

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**Abstract** In pumped storage reservoir, the phytoplankton community is regulated in a distinct way from that in the other types of reservoirs. To study its dynamics, we biweekly sampled the phytoplankton in Dajinshan Reservoir in 2005. Dajinshan Reservoir, is in the northern part of the in tropics in Guangdong Province. It is a typical pumped storage reservoir. 100 taxa were identified. P hytoplankton had an abundance ranging from  $0.86 \times 10^6$  to  $106.27 \times 10^6 \text{cells} \cdot \text{L}^{-1}$ , and total biomass varied from  $1.08$  to  $20.45 \text{mg} \cdot \text{L}^{-1}$ . The phytoplankton community was dominated by *Pseudanabaena* sp. across all the sampling year. *Synedra ulna*. had a high biomass in spring only. The composition of phytoplankton community was highly stable. Canonical correspondence analysis was used to investigate the environment-phytoplankton relationship. Case ordination by CCA divided all samples into four groups, distributed in the four districts forming axis 1 and axis 2, corresponding to the seasons: winter, spring, summer and autumn. Most samples were located in the districts of summer and autumn, and 54 main species were selected for performing of a CCA. The Cyanophyta, Bacillariophyta and Euglenophyta were restricted to the districts at the left of axis 1, While most of the Chlorophyta, Chrysophyta, and Cryptophyta were at the right of axis 1. Temperature and precipitation were the most important factors regulating the composition and dynamics of the community.

**Key words** [phytoplankton](#) \_ [environmental factors](#) \_ [canonical correspondence analysis](#) \_ [a pumped storage reservoir](#)

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