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15株微藻对猪场养殖污水中氮磷的净化及其细胞营养分析

Removal of nitrogen and phosphorus by 15 strains of microalgae and their nutritional values in piggery sewage

关键词: [微藻](#) [猪场养殖污水](#) [净化](#) [蛋白质](#) [脂肪酸](#)

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作者 单位

刘林林 上海海洋大学农业部淡水水产种质资源重点实验室, 上海 201306

黄旭雄 1. 上海海洋大学农业部淡水水产种质资源重点实验室, 上海 201306; 2. 上海市水产养殖工程技术研究中心, 上海 201306; 3. 上海高校知识服务平台上海海洋大学水产动物遗传育种中心(ZF1206), 上海 201306

危立坤 上海海洋大学农业部淡水水产种质资源重点实验室, 上海 201306

曾蓓蓓 上海海洋大学农业部淡水水产种质资源重点实验室, 上海 201306

穆亮亮 上海海洋大学农业部淡水水产种质资源重点实验室, 上海 201306

刘志坚 嘉兴大祺生物能源有限公司, 嘉兴 314006

蔡志武 嘉兴大祺生物能源有限公司, 嘉兴 314006

摘要: 在实验室条件下调查了15株淡水微藻在猪场养殖污水中的生长性能、细胞组成及各微藻对污水中氮磷的去除效果.结果表明: 15株微藻均可有效降低猪场养殖污水中的氮磷含量, 但不同藻株对污水中不同形态氮的去除效果差异明显.多棘栅藻 (*Scenedesmus spinosus*) SHOU-F7、多棘栅藻 (*S.spinossus*) SHOU-F8和四尾栅藻 (*S.quadricanda*) SHOU-F35去除总氮效果最佳.多棘栅藻SHOU-F7、多棘栅藻SHOU-F8和斜生栅藻 (*S.obliquus*) SHOU-F21去除硝态氮效果最好, 最大去除率可达到100%.椭圆小球藻 (*Chlorella ellipsoidea*) SHOU-F3、单生卵囊藻 (*Oocystis solitaria*) SHOU-F5和四球藻 (*Tetrachlorella alternans*) SHOU-F24去除氨态氮效果最好, 最大去除率为97.82%.各株微藻对污水中总磷的去除率均很高, 可达91.00%以上.利用猪场养殖污水培养的各株微藻细胞蛋白含量及脂肪酸组成差异显著, 蛋白含量最高的为椭圆小球藻 (*Ch.ellipsoidea*) SHOU-F3 (43.90%), 含量最低的为多棘栅藻SHOU-F8 (23.87%); 16: 0和18: 3n3在各株微藻中含量均较丰富.多棘栅藻SHOU-F7、多棘栅藻SHOU-F8、淡水小球藻 (*Chlorella sp.*) SHOU-F19和针形纤维藻 (*A.acicularis*) SHOU-F120的脂肪酸甲酯的理论烷基值超过47.因此, 多棘栅藻SHOU-F7、多棘栅藻SHOU-F8和四尾栅藻SHOU-F35是净化猪场养殖污水的优良藻株, 其中, 多棘栅藻SHOU-F8是猪场养殖污水净化耦合微藻生物柴油生产的合适藻株.

Abstract: This paper investigated the growth performances, nutritional values and nitrogen and phosphorus removals of 15 strains of freshwater microalgae in piggery sewage under lab condition. The results indicated that all 15 microalgae strains reduced the nitrogen and phosphorus levels in piggery sewage effectively. While there were significant differences in removal efficiency among the strains, *Scenedesmus spinosus* SHOU-F7, *S.spinossus* SHOU-F8 and *S.quadricanda* SHOU-F35 displayed the best removal of total nitrogen. *S.spinossus* SHOU-F7, *S.spinossus* SHOU-F8 and *S.obliquus* SHOU-F21 displayed the highest nitrate nitrogen removal rate of 100.00%. *Chlorella ellipsoidea* SHOU-F3, *Oocystis solitaria* SHOU-F5 and *Tetrachlorella alternans* SHOU-F24 had the highest ammonia nitrogen removal rate of 97.82%. All the tested strains had very high phosphorus removal rate, which were more than 91.00%. There were significant differences in cell protein content among the microalgae strains grew in piggery sewage. *Ch. Ellipsoidea* SHOU-F3 had the highest protein content (43.90%), while *S.spinossus* SHOU-F8 had the lowest protein content (23.87%). The fatty acid profiles were also different among the strains. The theory cetane numbers of biodiesel from *S.spinossus* SHOU-F7, *S. spinossus* SHOU-F8, *Chlorella sp.* SHOU-F19 and *A. acicularis* SHOU-F120 were more than 47. Therefore, *S.spinossus* SHOU-F7, *S. spinossus* SHOU-F8 and *S. quadricanda* SHOU-F35 are qualified for purification on piggery sewage, and *S.spinossus* SHOU-F8 could be the appropriate microalga strain for piggery sewage purification coupling with microalgae biodiesel production.

Key words: [microalgae](#) [piggery sewage](#) [purification](#) [protein](#) [fatty acid](#)

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主办单位：中国科学院生态环境研究中心

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服务热线：010-62941073 传真：010-62941073 Email: hjkxxb@rcees.ac.cn

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