ORL-EM&P-07
Strategies for Mitigating Off-Flavors and Enhancing the Quality of Pond-Cultured Grass Carp *Ctenopharyngodon idella*

Li Kang*, Yan Li, Luo Xueneng, Zhang Junming, Han Huan, Shen Ziqian, Jin Xichen, Li Jiawei, Huang Hongmin, Wu Zhenghai, Kamala Gharti, and Liu Liping

China-ASEAN Belt and Road Joint Laboratory on Mariculture Technology (Shanghai), Shanghai Ocean University, Shanghai 201306, China;
Center for Ecological Aquaculture (CEA),
Shanghai Ocean University, Shanghai 201306, China
kli@shou.edu.cn, likang3127@hotmail.com

As consumer demand for high-quality aquatic products grows, the occurrence of off-flavors in freshwater fish, particularly in pond-cultured systems, presents significant challenges to the aquaculture industry. Off-flavor substances in fish negatively impact marketability and lead to economic losses. This study investigates the environmental behaviors and sources of key off-flavor compounds in pond-cultured grass carp (*Ctenopharyngodon idella*) over the course of the production cycle, with a focus on geosmin (GSM) and 2-methylisoborneol (2-MIB).

The research examines the dynamic interactions between water quality, algal community composition, and the concentrations of GSM and 2-MIB in pond environments. Additionally, off-site purification technologies were evaluated using a land-based temporary holding system to mitigate off-flavors and improve the sensory and textural qualities of grass carp fillets.

Results revealed a negative correlation between pond water pH and the accumulation of GSM and 2-MIB. GSM levels exhibited a significant positive correlation with total phosphorus ($P<0.05$, $r = 0.72$), while 2-MIB showed significant positive correlations with ammonia nitrogen, total nitrogen, and total phosphorus ($P<0.05$). In the land-based purification system, various flow rate treatments effectively reduced the concentration of off-flavor compounds, particularly 2-MIB ($P<0.05$), without significant differences between flow rate groups. Lower flow rates were associated with a reduction in taste-related amino acids (bitter, sweet, umami) ($P<0.05$), while higher flow rates preserved the texture characteristics of the fish, including increased hardness, elasticity, and chewiness ($P<0.05$).

This study highlights the critical environmental factors and algae species contributing to off-flavor production in grass carp ponds and offers insights into precision quality management. The land-based purification system was particularly effective in improving fish quality, enhancing umami flavor, and rapidly removing off-flavor substances, with higher flow rates proving more efficient than lower flow treatments.