

Supplementary material for

Bioaugmentation with an aerobic denitrifying bacterium with quorum quenching activity for improved nitrogen removal and reduced membrane fouling in anoxic/oxic membrane bioreactor

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Text S1. The composition of the synthetic wastewater

The composition of the synthetic wastewater was as follows (/L): CH₃COONa, 540 mg; NH₄Cl, 160 mg; KH₂PO₄, 20.00 mg; NaHCO₃, 300 mg; MgSO₄, 15.63 mg; FeCl₃, 0.075 mg; CaCl₂, 2.45 mg; MnSO₄, 1.8 mg.

Text S2. Nitrogen mass balance

According to the nitrogen mass balance, nitrogen in the influent left the A/O-MBR in three main forms: (i) total nitrogen in the effluent; (ii) nitrogen carried by the residual sludge; and (iii) nitrogen converted to gaseous nitrogen by denitrification. Therefore, the nitrogen removed by denitrification could be calculated by the following equation:

$$M_{in, TN} = M_{out, TN} + M_{out, sludge} + M_{out, denitrification}$$

$$M_{in, TN} = Q_{in, wastewater} C_{in, TN}$$

$$M_{out, TN} = Q_{out, wastewater} C_{out, TN}$$

$$M_{out, sludge} = Q_{out, sludge} X_V f_N$$

where $M_{in, TN}$, $M_{out, TN}$, $M_{out, sludge}$ and $M_{out, denitrification}$ represent the total nitrogen in the influent water (kg/d), the total nitrogen in the effluent water (kg/d), the nitrogen contained in the discharged sludge (kg/d) and the nitrogen converted by denitrification (kg/d), respectively; $Q_{in, wastewater}$, $Q_{out, wastewater}$ and $Q_{out, sludge}$ represent the influent flow (m³/d), effluent flow (m³/d) and discharged sludge volume (m³/d), respectively; $C_{in, TN}$ and $C_{out, TN}$ represent the influent total nitrogen concentration (kg/m³) and effluent total nitrogen concentration (kg/m³), respectively; X_V represents mixed liquor volatile activated sludge concentration (kg VSS/ m³); f_N represents the content nitrogen in activated sludge (kg N/kg VSS), which was usually taken as 0.1.

Text S3. Assessment of QQ activity of strain WZL728

The method to determine the degradation ability of supernatant of strain WZL728 to various AHLs with long acyl chains was referred to Wei et al. [1]. In addition, the concentration of AHLs in the supernatant was determined by LC-MS as described in Section 2.2. The average degradation rate of AHLs in supernatant was calculated to determine the QQ activity of strain WZL728.

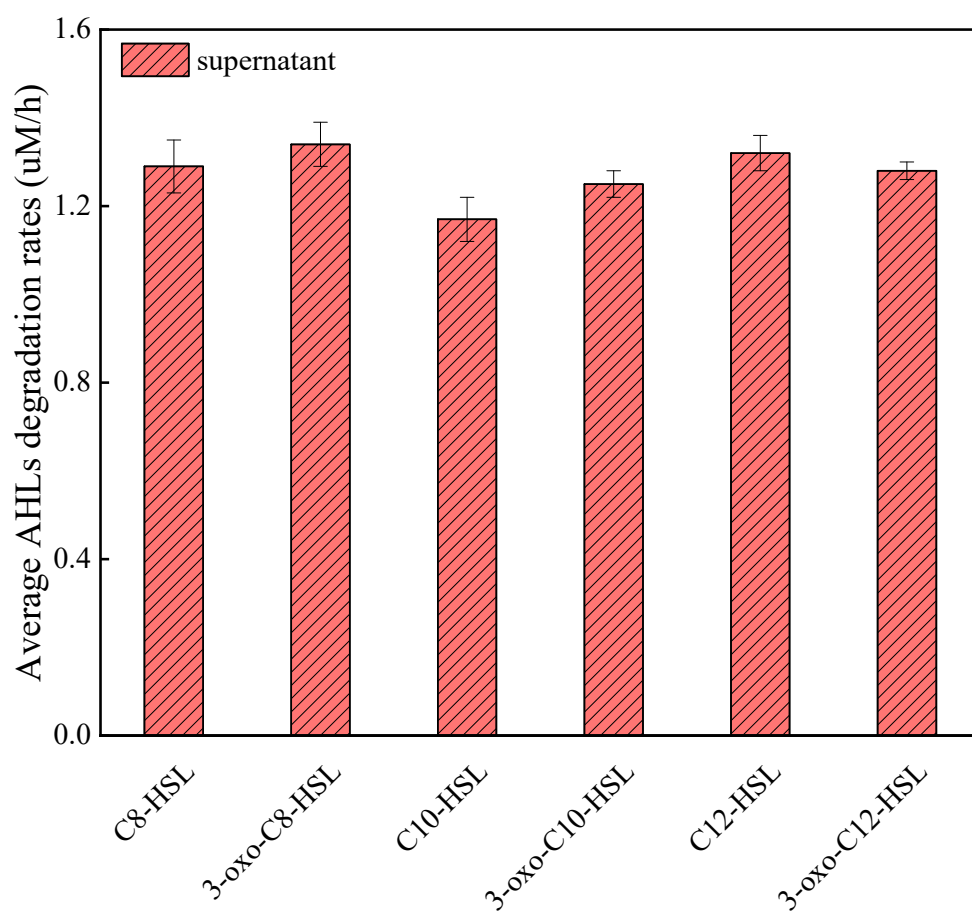


Figure S1. Average degradation rates of the supernatant of strain WZL728 for AHLs with long acyl chains

Reference

1. Wei, P.Y.; Zhang, J.; Li, J.; Zheng, Z.M.; Wang, Z.Z.; Han, H.; Zhang, Y.; Luo, R.
Isolation and identification of a novel aerobic denitrifying bacterium with quorum
quenching activity and the effect of environmental factors on its performance.
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