

Protozoan Population as an Indicator of the Aerobic or Anoxic State of the SBR Operating Cycle

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Key words: SBR, protozoa, nitrification, denitrification, biological indicator.

The use of the microfauna analysis to estimate both the quality of the effluent and the performance of the treatment plant is becoming more and more common. The importance of protozoan population in biological wastewater treatment systems has been widely studied for a number of treatment options, such as the activated sludge system, trickling filter systems and rotating biological contactors. However, only a few studies were published on protozoan population in sequencing batch reactors (SBR).

The aim of this research was to investigate the changes in microfauna during a typical operating cycle and the potential of protozoa to act as indicators of the operational phase.

The SBR was operated over a 10 months experimental period with the purpose of achieving nitrification/denitrification. The inoculum was mainly composed by a sample of mixed liquor from the aerated tank of a municipal wastewater treatment plant. The feed was a brewery wastewater after anaerobic pre-treatment. During the last 10 days, microscopic analysis of the reactor contents was performed throughout each cycle and protozoa were identified. At this time, the operating cycle consisted of a long aerated period followed by an anoxic phase. The dissolved oxygen (DO) was regulated by on-off control of the air flow.

During the aerated period (DO=3-4 mg/L) crawling and attached ciliates were the predominant protozoa in the system. With the decrease of the DO concentration throughout the unaerated phase, these species showed a reduction of 40% and the appearance of free swimming ciliates and flagellated protozoa could be observed (Figure 1), indicating a poorly aerated sludge. Crawling and attached ciliates always re-established themselves as the aerobic conditions took place again, indicating that the cyclic operations had no detrimental effect on protozoa. The presence of *Vaginicola* sp., a common specie in nitrifying activated sludge systems, was often observed.

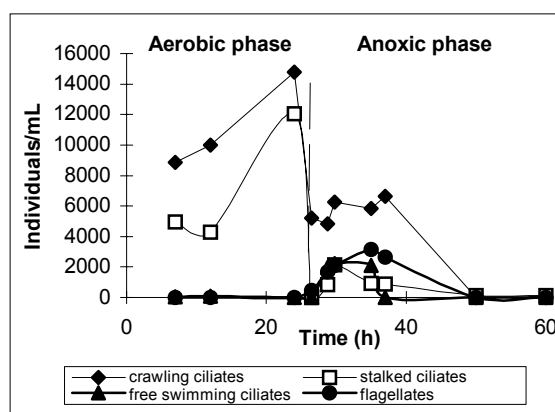


Figure 1. Changes in microfauna during a typical operating cycle of the SBR .

Table 1. Protozoa observed during a typical operating cycle.

Functional group	Functional sub-group	Observed species
Ciliated protozoa	Stalked	<i>Vorticella</i> sp. <i>Epistylis</i> sp.
	Free swimming	<i>Vaginicola</i> sp.
		<i>Uronema</i> sp.
		<i>Colpidium</i> sp.
	Crawling	<i>Aspidisca</i> sp. <i>Chilodonella</i> sp.
Flagellated protozoa	-	<i>Peranema</i> sp.

The results showed that the dominance of species of a certain functional sub-group of protozoa (Table 1) in the mixed liquor is related with the operational phase of the SBR.

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