Seasonal Variations of the Growth of Filamentous Bacteria in Kuwait's Wastewater Treatment plants

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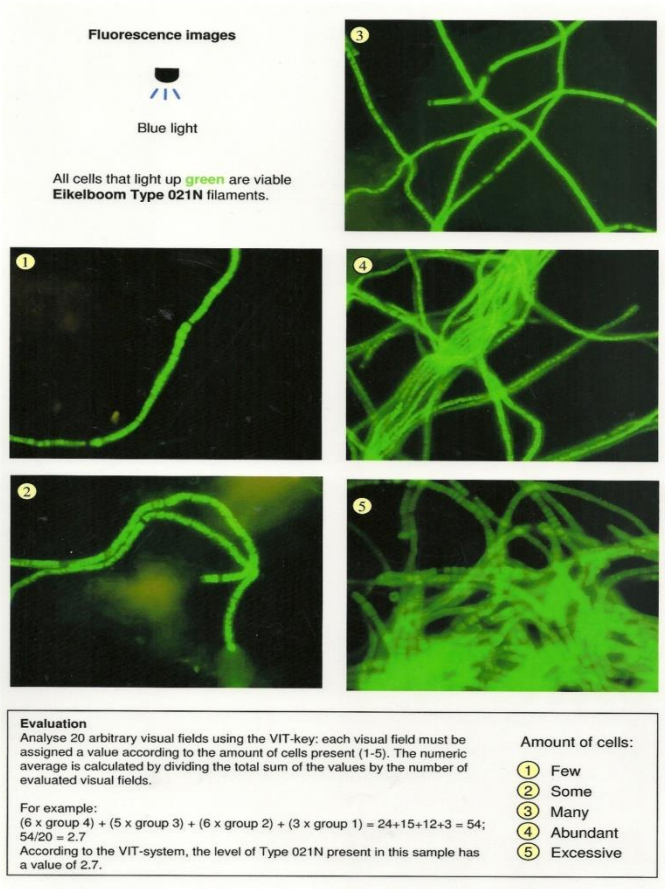
Introduction

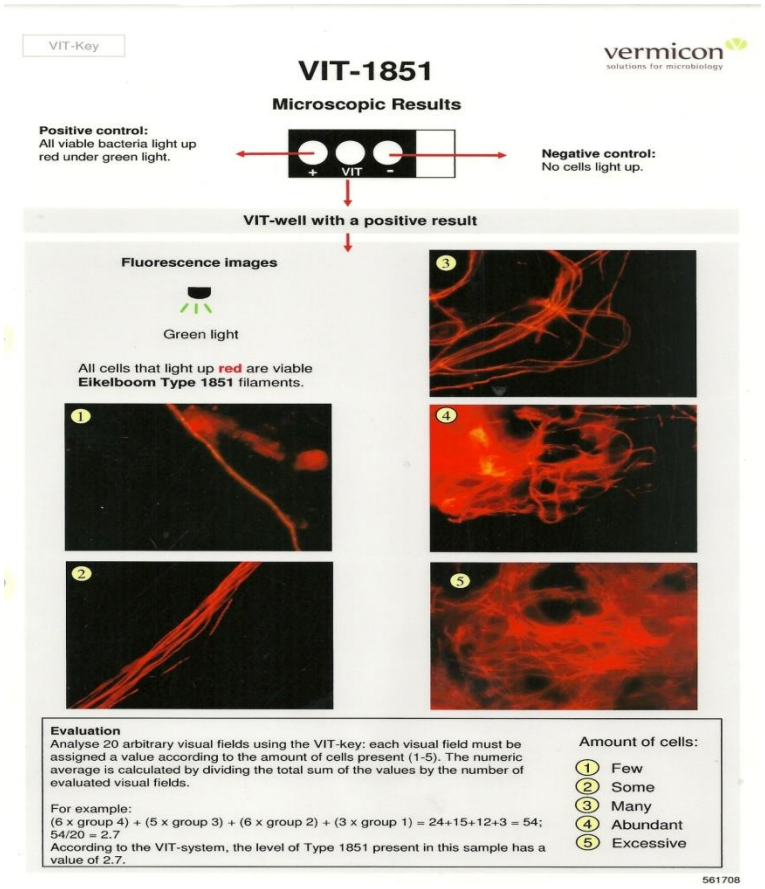
- Filamentous bacteria grow naturally in activated sludge systems.
- They provide the backbone for other types of bacteria to grow
- However, excessive filamentous sludge bulking and foaming are the most common operational problems of activated sludge systems.
- If not properly controlled, excessive sludge bulking and foaming can lead to a complete failure of the entire wastewater treatment process.
- Usually filamentous bacteria are identified through conventional microscopic method, which is laborious and unreliable.
- In this study, however, we used the German technology VIT, which is based on molecular biology techniques, to identify and quantify the filamentous bacteria dominating Kuwait's wastewater treatment plants.

Materials and Methods

- Grab samples of wastewater and sludge were collected weekly from four locations along Riqqa and Umm-Al-Haiman activated sludge systems: influents, aeration tank, secondary effluent and tertiary effluent streams.
- Routine wastewater quality parameters were also determined following APHA (2012) method. Accordingly, the system operating variables were then calculated.
- Filamentous bacteria were identified using the following six Vermicon Identification Technology (VIT) kits: VIT-1851, VIT-H. hydrossis, VIT-Nocardiaform, VIT-021N/Thiothrix, VIT-N. Limicola II and VIT-M. parvicella.
- Filaments identification method used was according to Vermicon's instructions
- Filamens quantification (scoring) was also according to Vermicon's instructions: 0: None, 1: few, 2: some, 3: many, 4: abundant and 5: excessive.

Cont. Materials and Methods





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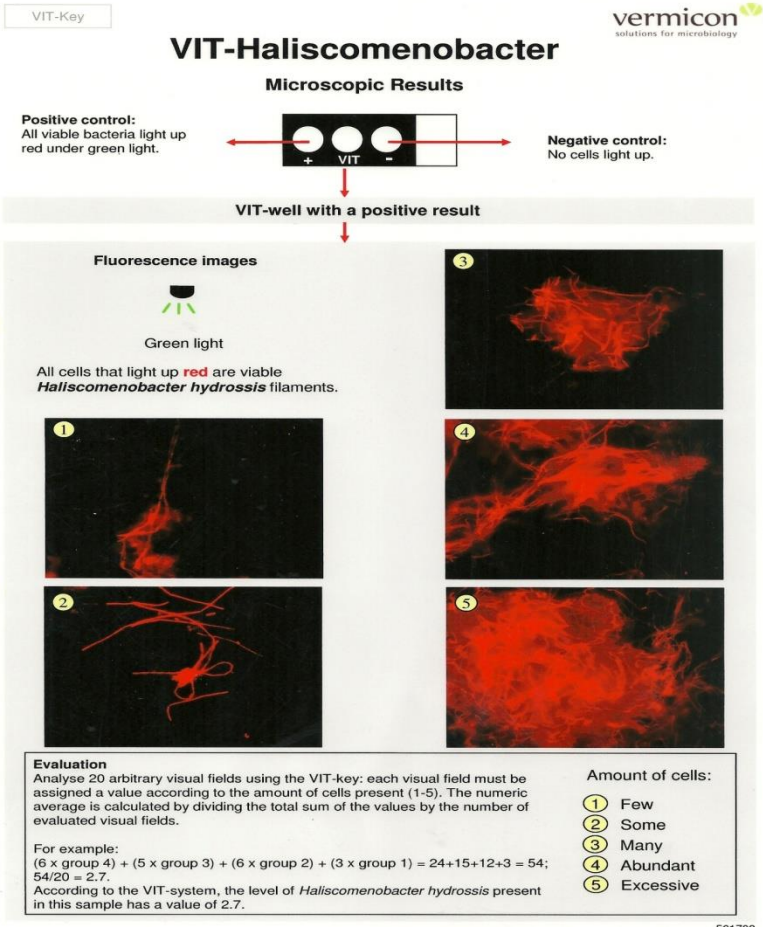

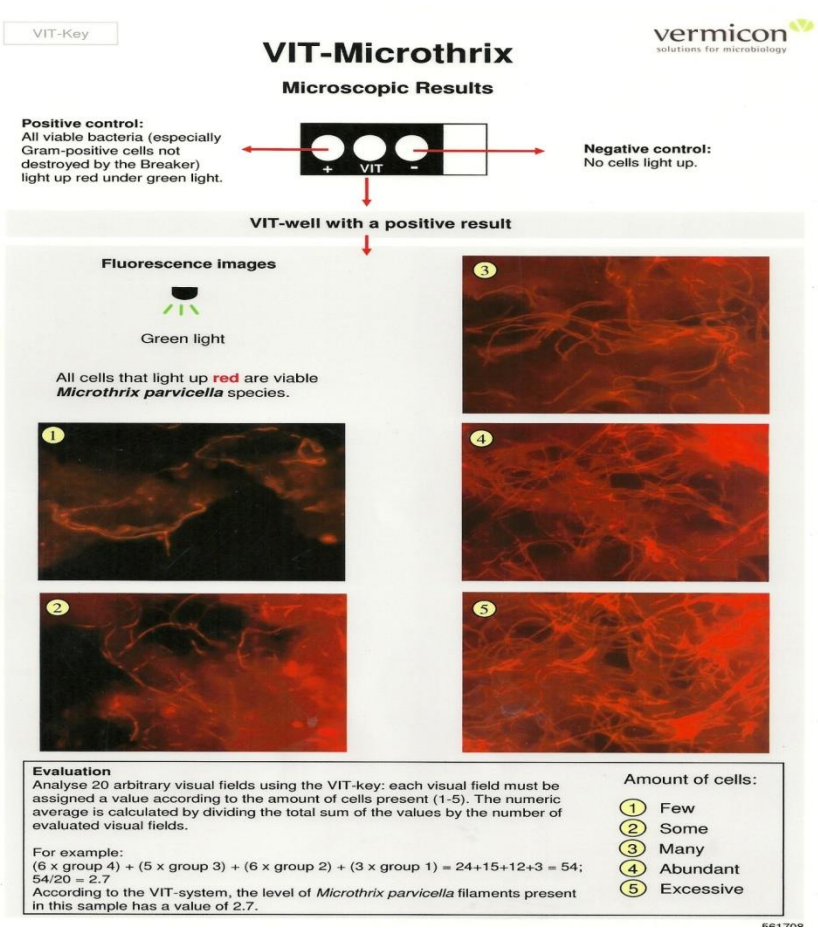

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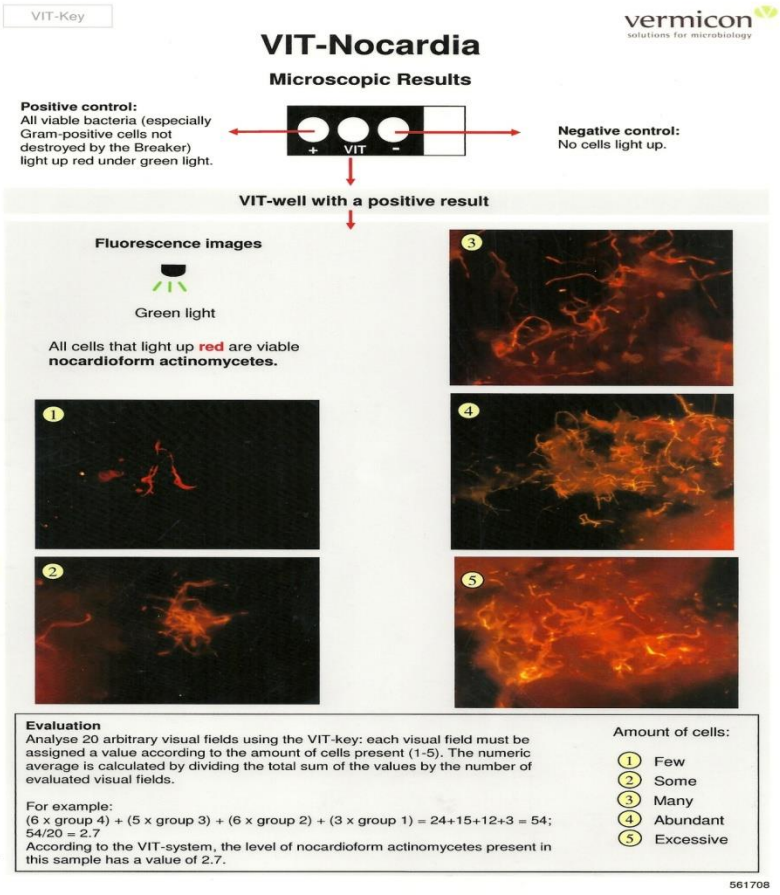
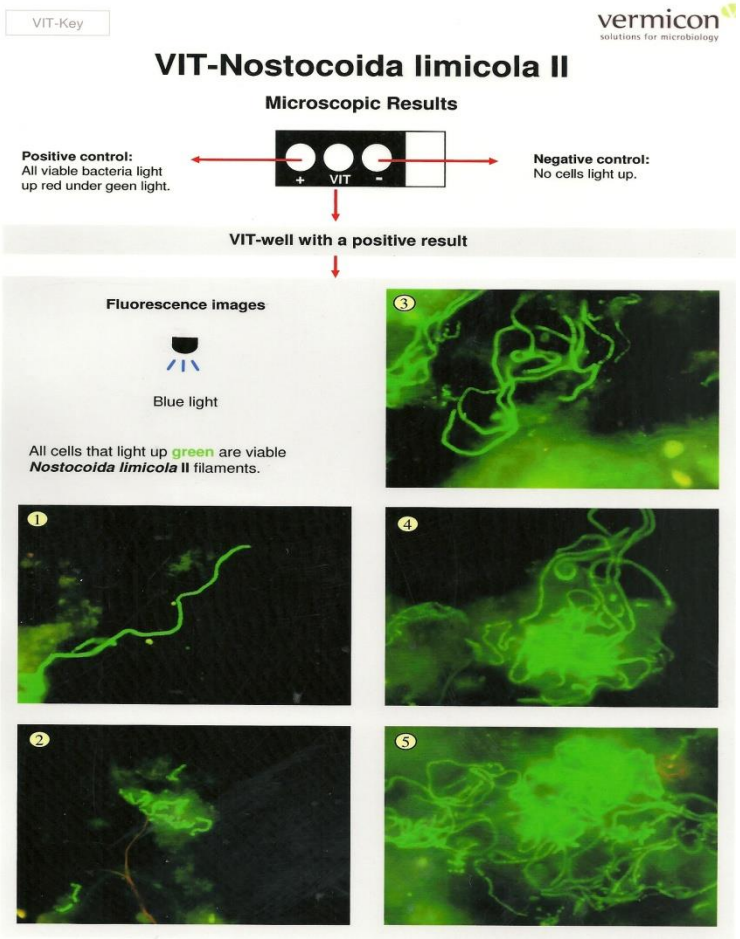
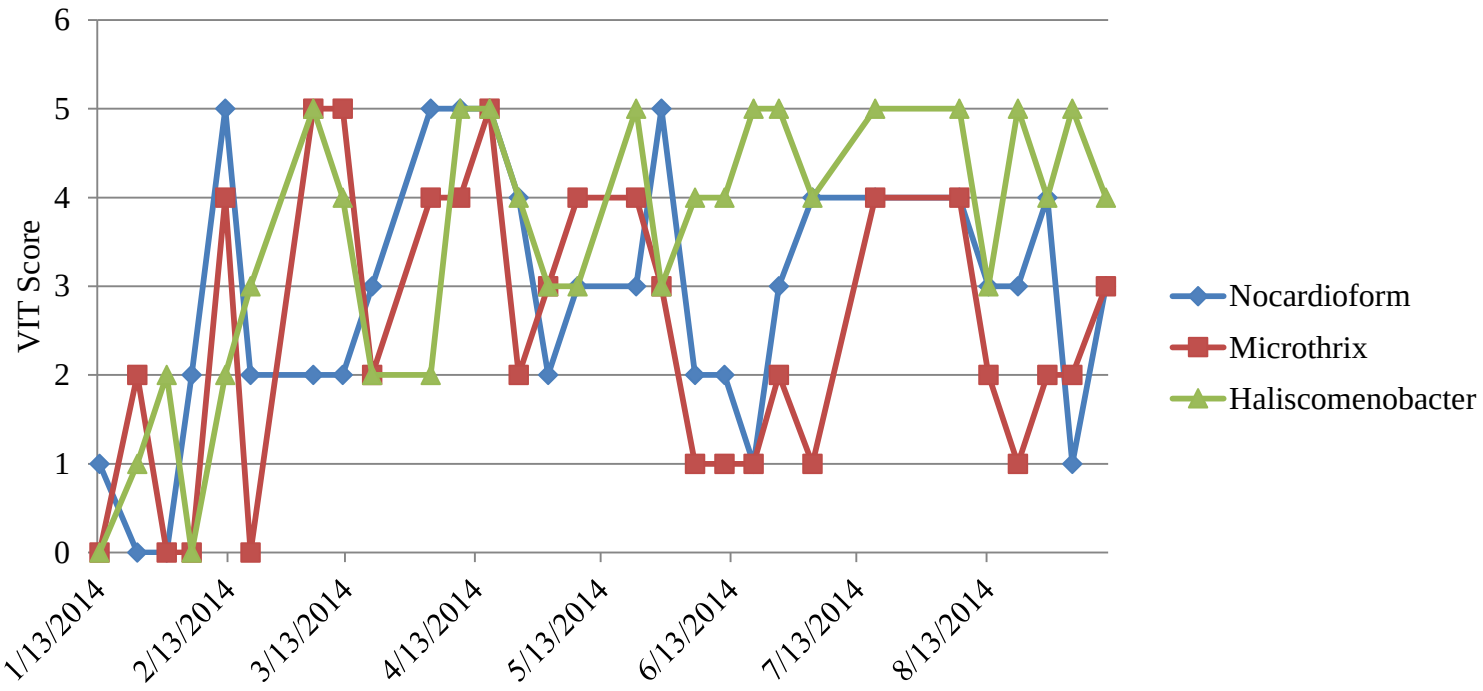




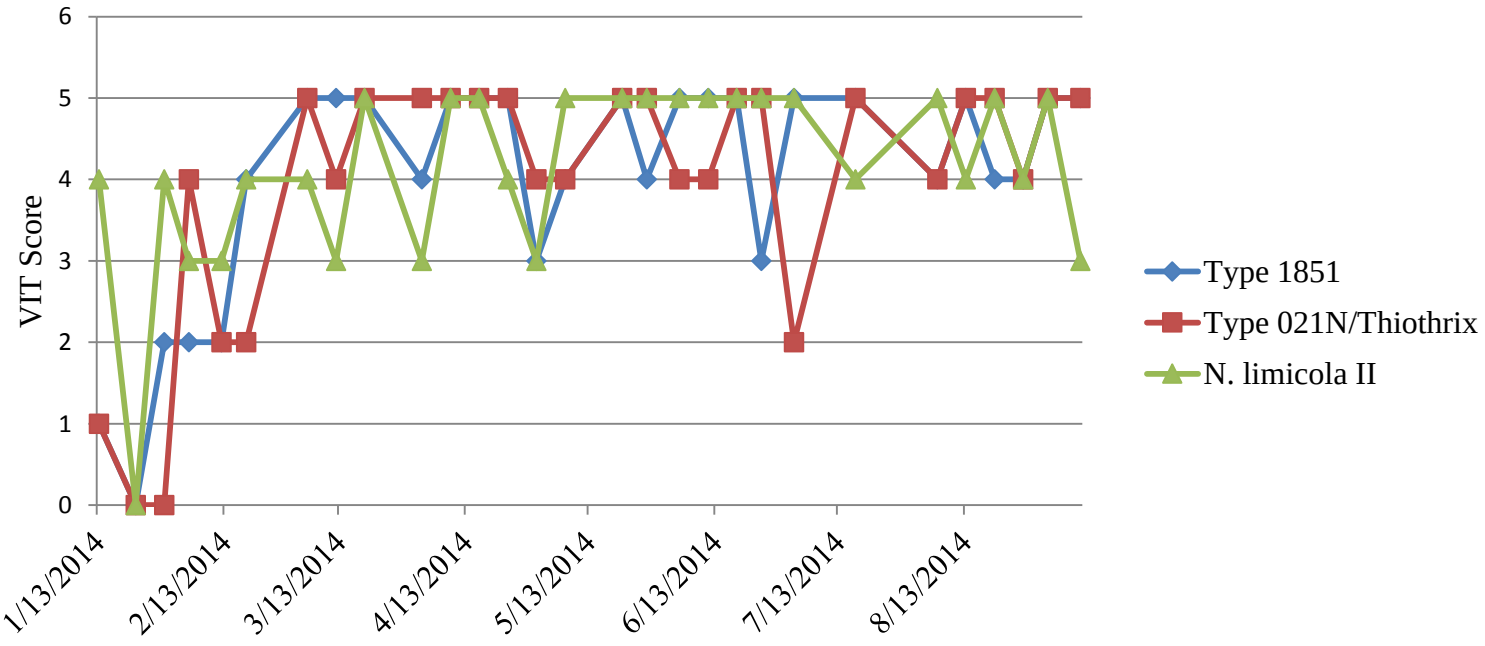
Results

Score of filamentous bacteria identified in Riqqa Aeration tank.



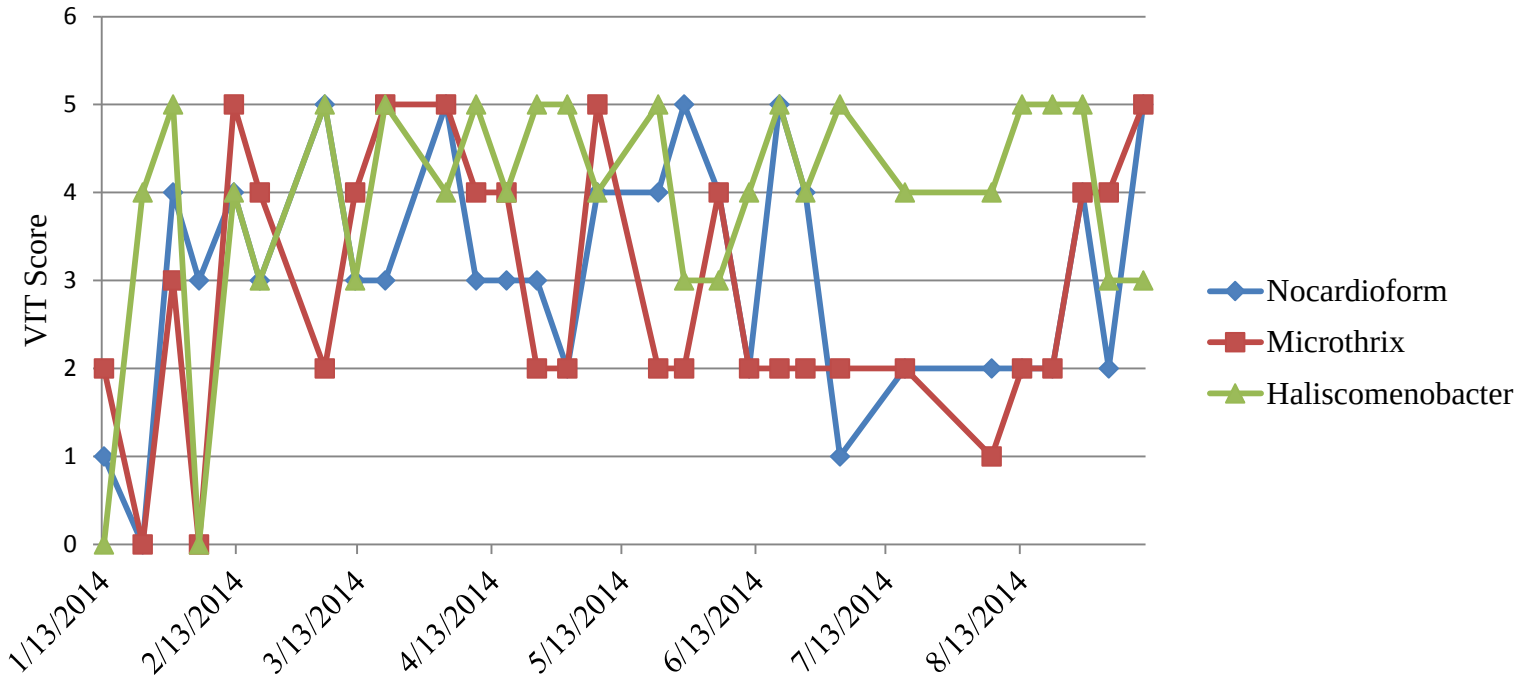
Cont. Results

Score of filamentous bacteria identified in Riqqa Aeration tank Cont.



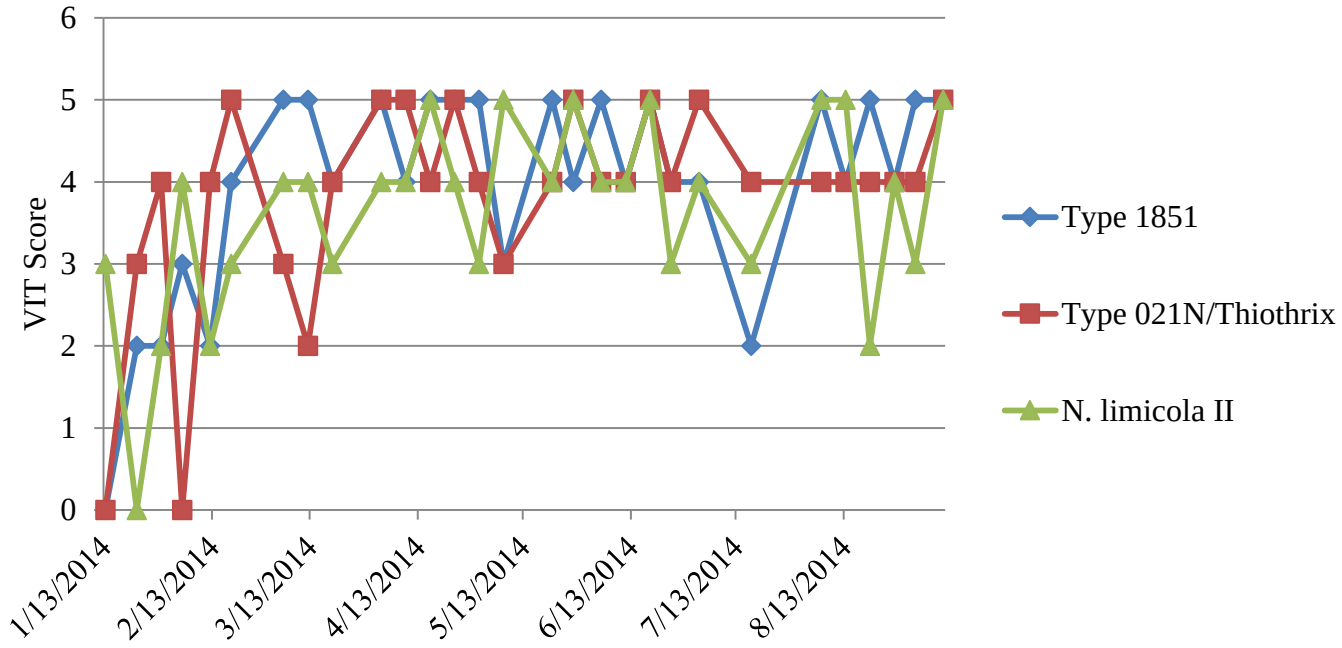
Cont. Results

Score of filamentous bacteria identified in Umm-Al-Haiman Aeration tank.



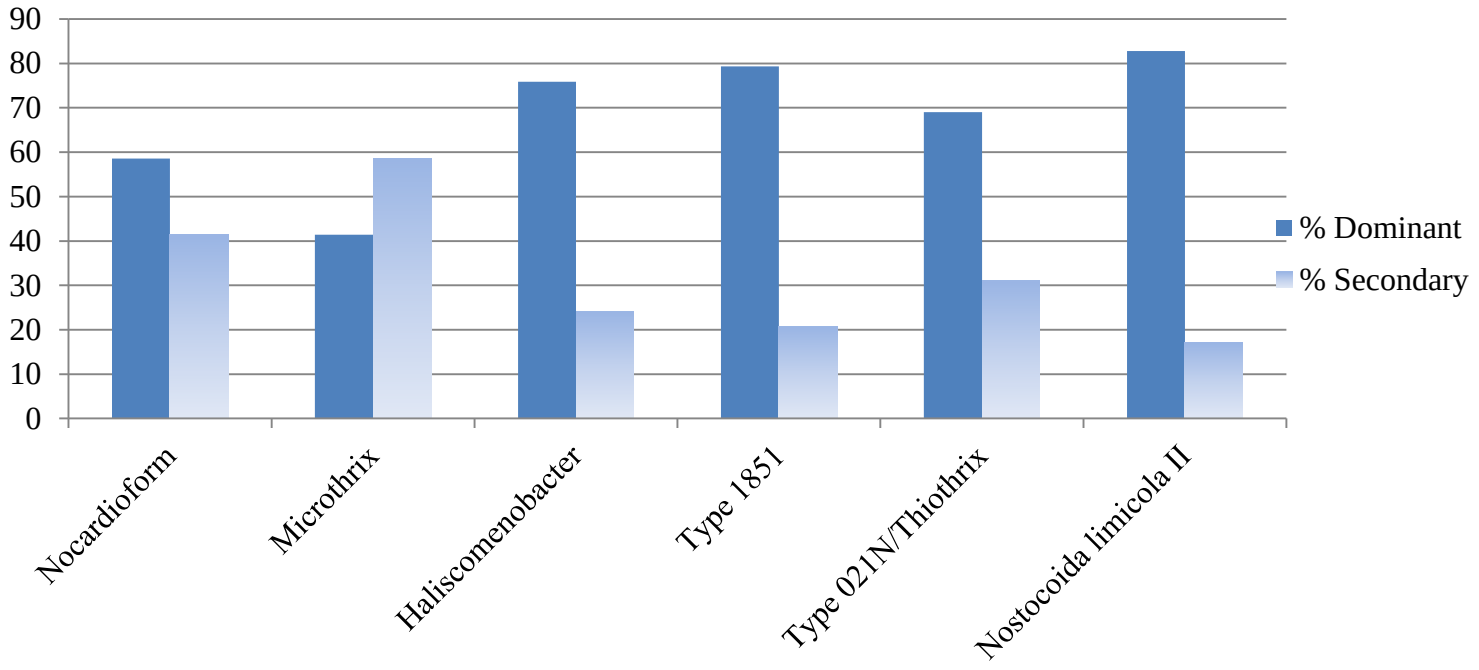
Cont. Results

Score of filamentous bacteria identified in Umm-Al-Haiman Aeration tank Cont.



Cont. Results

Percent of time dominance of filaments in Riqqa system



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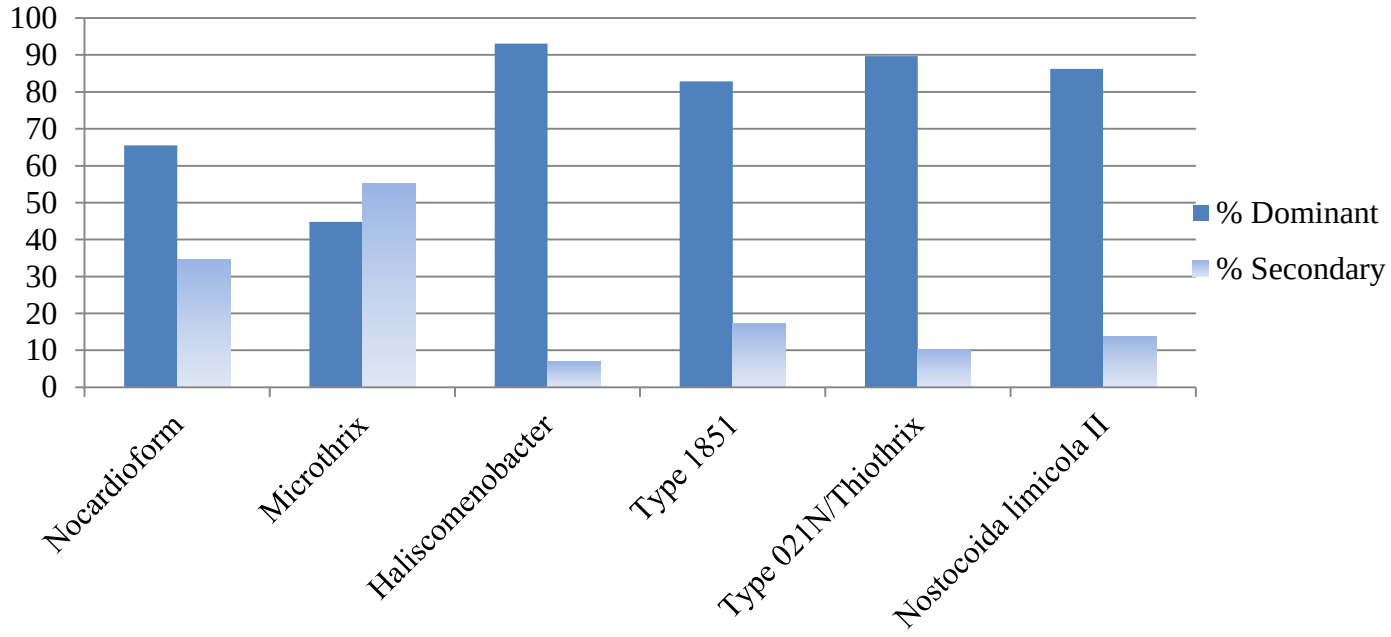
Percent of time dominance of filaments in Umm-Al-Haiman system



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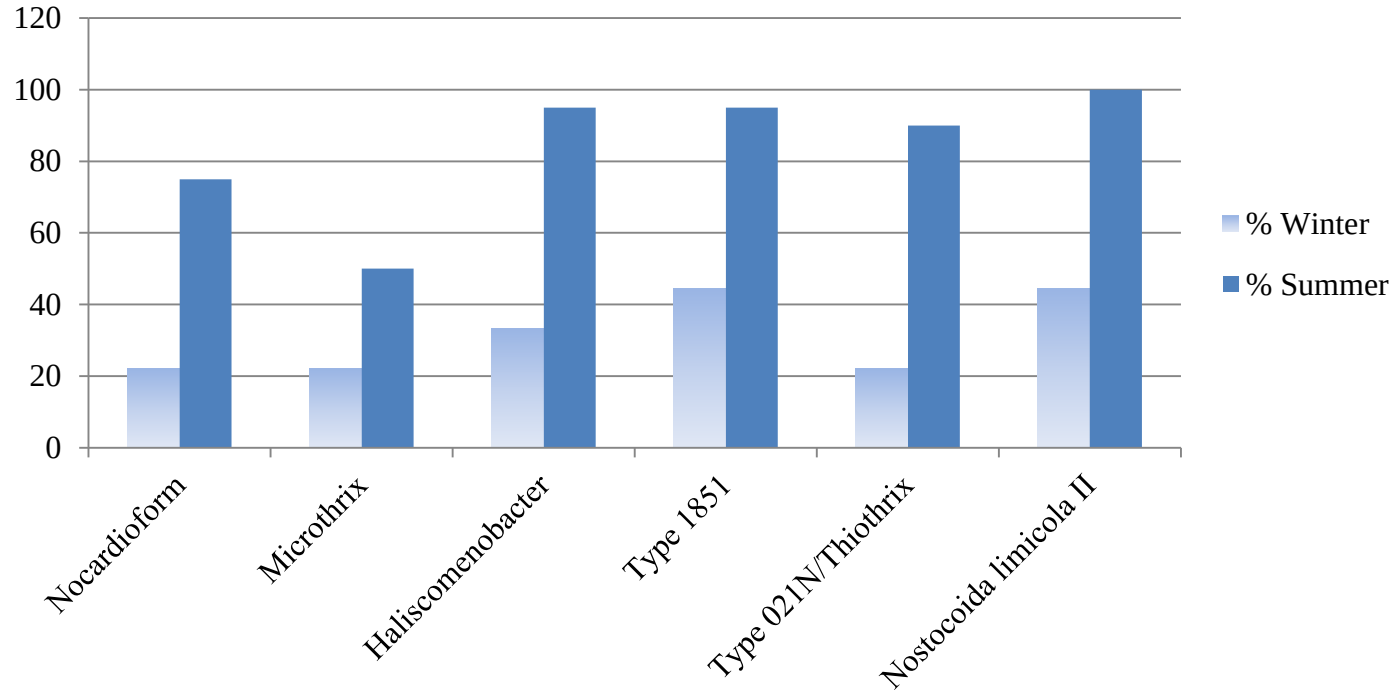
Seasonal dominance of filaments in Riqqa system



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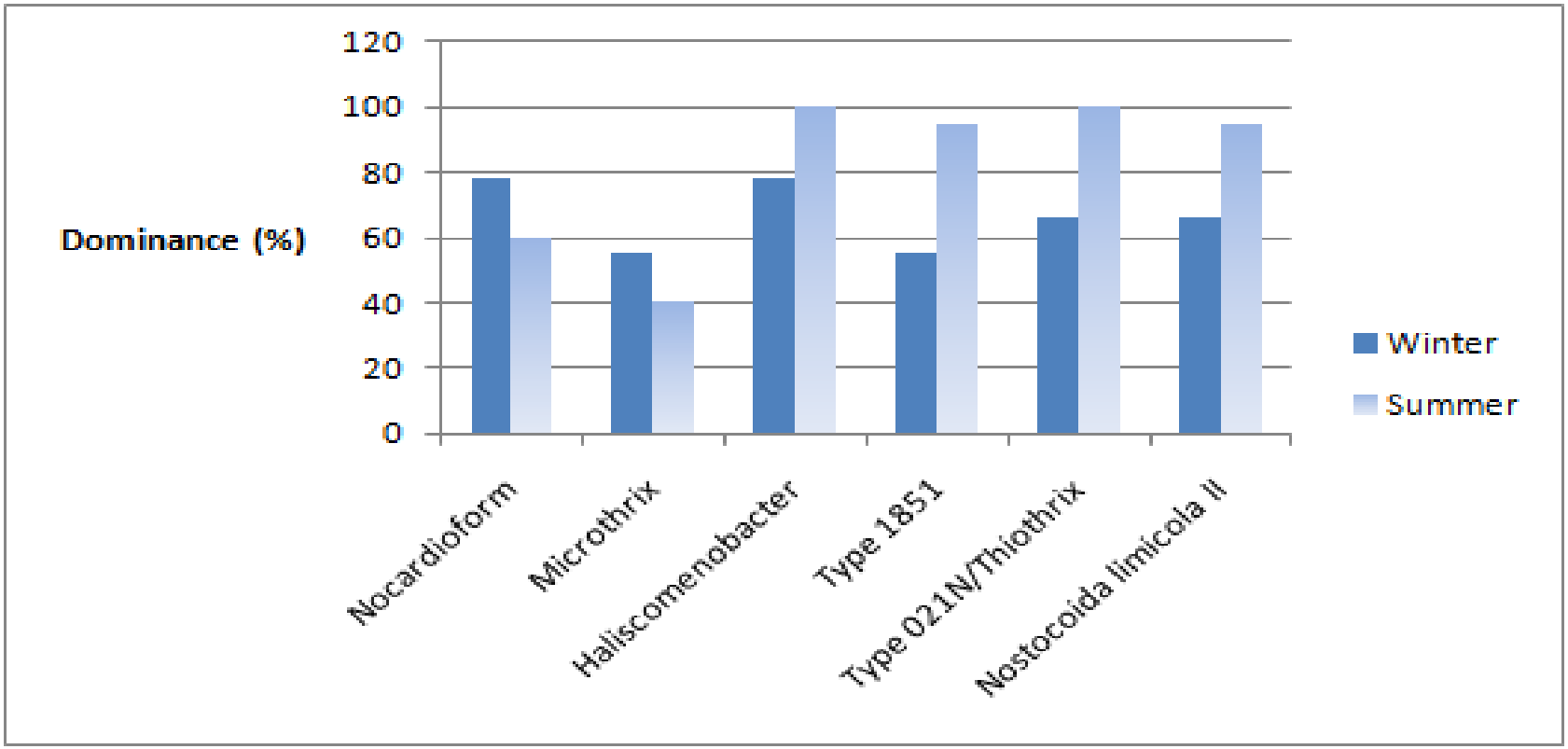
Seasonal dominance of filaments in Umm-Al-Haiman system



Conclusions

- The types of filamentous bacteria dominating in Riqqa and Umm Al-Haiman-activated sludge systems were identified using VIT kits (Vermicon Identification Technology, Munich, Germany).

- An analysis of the identification results obtained indicated that the following four types of filamentous bacteria were dominant (> 70% of observation time) in both systems: N. limicola II, Type 1851, Haliscombacter and Nacordioform.

- Dominance of these filaments was found to be higher during the summer season than the winter season

Acknowledgements

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