

# ABOUT NEMATODES AS A FACTOR TO CONSIDER IN THE PROCESSES OF NON CONVENTIONAL TECHNOLOGIES FOR WASTEWATER TREATMENT AND REUSE

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## Introduction

- Nematological analysis, considered in recommendations, guidelines and international legislations, approved by the Comitee on Standard Methods (1959) shows a group with great abundance and diversity. In wastewaters the removal of total nematodes can be used as a factor of efficiency degree in wastewater treatments.
- For this study three Biological types of total nematodes have been considered, according the Gadea classification (Gadea, 1952). Bacteriofagous nematodes, rabditoide type contribute to reduce both BOD and concentrations of faecal bacteria (Santos *et al.*, 2005). Predaceous nematode, triloboide type, contributes to the balance in the populations of nematodes in these means besides feeding other microorganisms. Plant-parasitic nematodes, tilencoide type, are considered in mind that remains in the studied systems and would be passed on later, supposing a great risk for host crops in the event these are watered with reclaimed water carrier for these organisms (Santos *et al.*, 2004, 2005).
- On the other hand, physic-chemical parameters related with wastewater treatment (BOD<sub>5</sub>, COD and TSS) have been evaluated in all samples

## Methods

- Studies were carried out on samples of different treatment systems established in the Experimental Plant of Carrión de los Céspedes, PECC (Seville, Spain), belonging to the Center of New Water Technologies (CENTA). The studied effluents are from Waste Stabilisation Ponds, Constructed Wetlands (2 vertical flow, 3 horizontal flow and 1 free flow, working in combination) and Peat Filters. Likewise were studied influent water and, punctually Imhoff Tank.

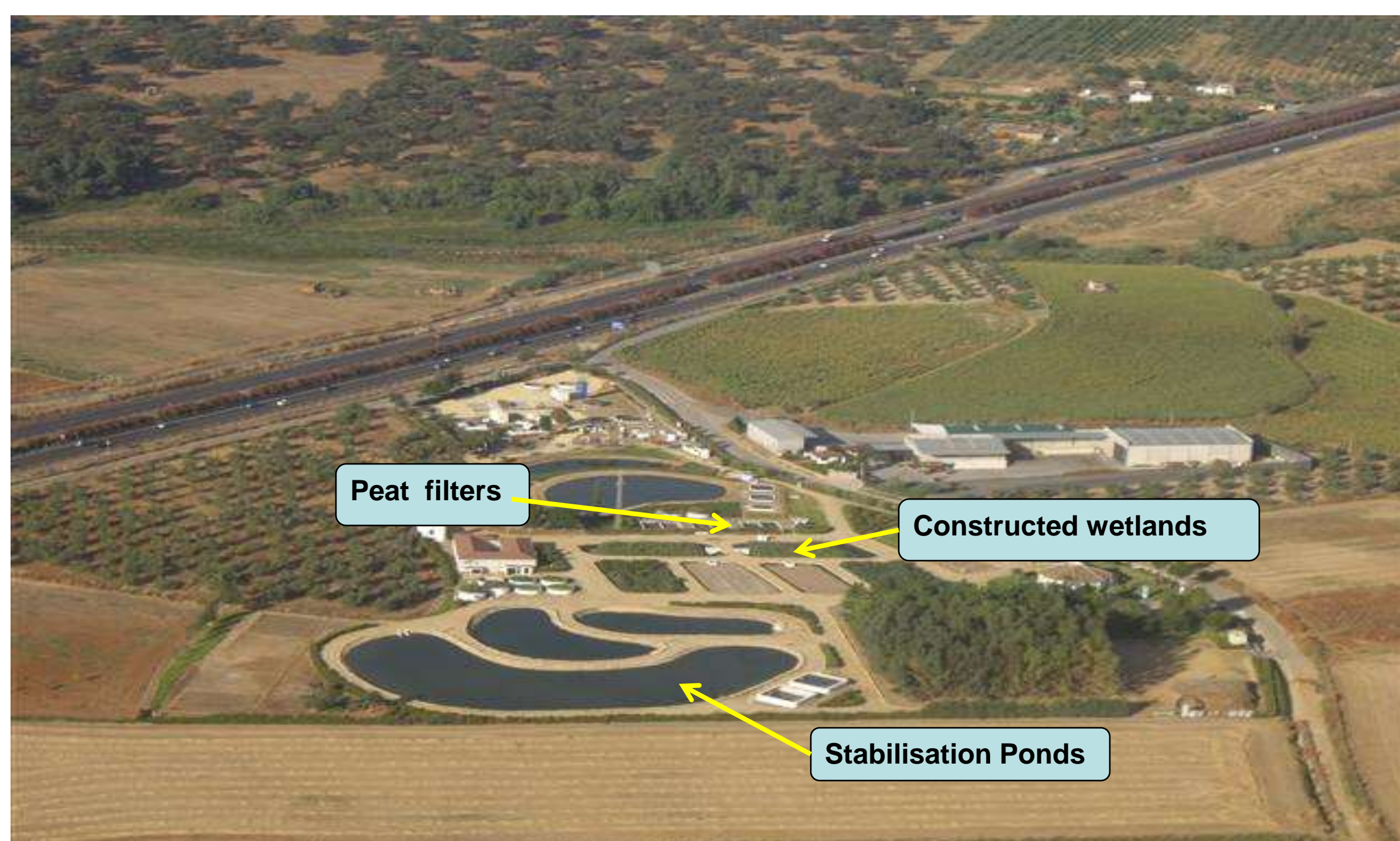
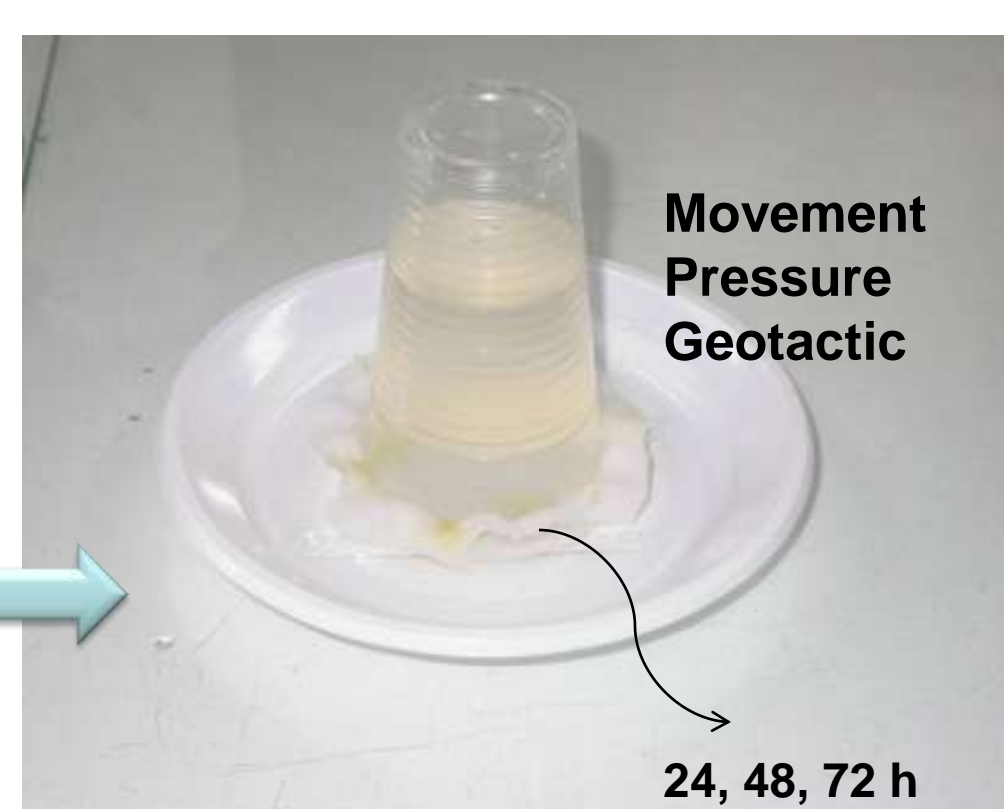


Fig. 1. Overview of monitored treatments in Experimental Plant of Carrión de los Céspedes (Seville, Spain)

- For isolating nematodes have been used decantation and filtration techniques, carried out in samples of 10 liters, proceeding to the direct filtration to separate nematodes by using different filters in order to separate by mesh. In the case of dense or very dense samples, a previous filtration is applied in inverted glass just is carried out in the technique of Decantation and filtration of Cobb, according to Flegg (1967).



## Results and Discussion

- Influent water takes a high load of nematodes and, keeping in mind both the frequency and the punctual character of the samples, we can consider it as an important vector of nematodes. (Fig. 2 and 3)
- Effluents of final Maturation Pond present high nematodes removal and do not contribute to the presence of nematodes except when this system was removed for its cleaning.
- In Constructed Wetlands the presence of nematodes is very low. In the Imhof Tank we can not conclude on the nematodes removal because have been taken few samples.
- In the Peat Filter total removal of nematodes belongs to the coincidence of the sampling with the change of the filter.

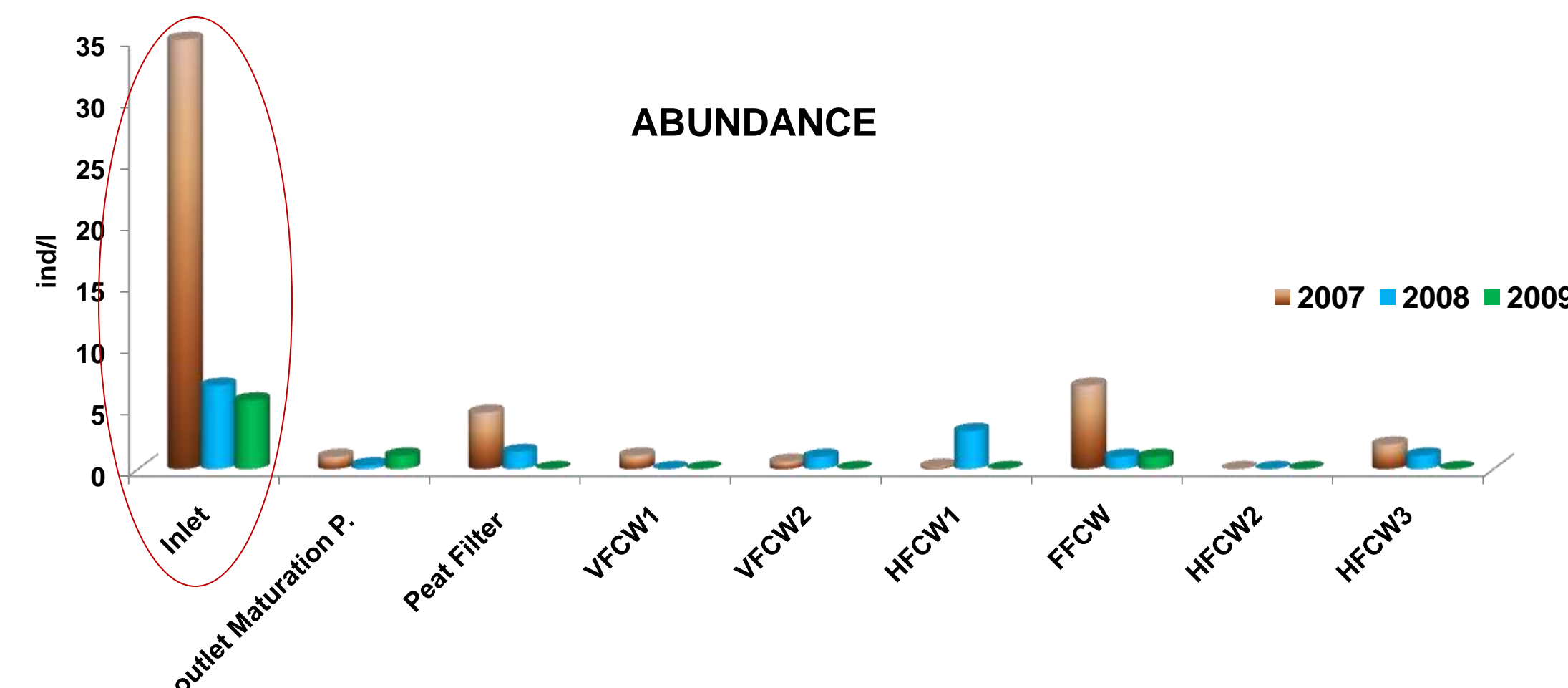


Fig. 2. Abundance (ind/l) of total nematode in different monitored wastewater treatments

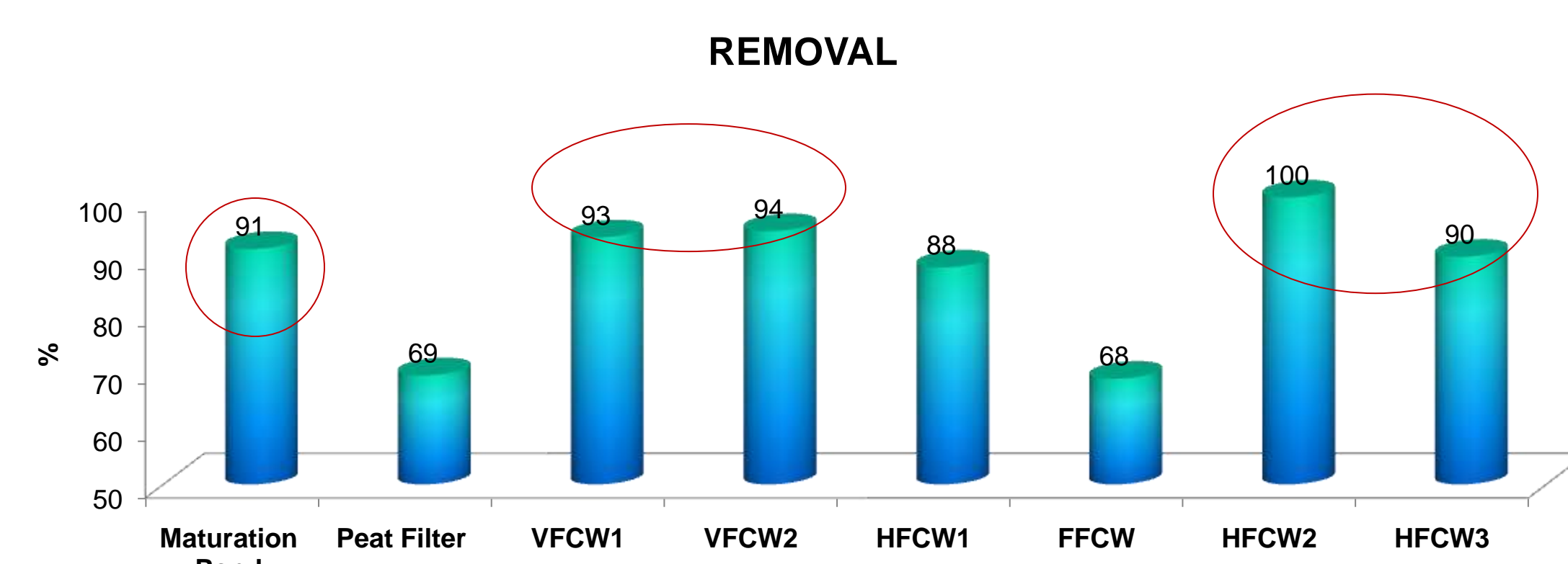


Fig. 3. Removal (%) of total nematode in different monitored wastewater treatments

- There were nematodes belonging to the three biological types and in all stages of their cycles indicating that conditions are good for their development and removal the population, being the gravid females and second juvenile stage, J2, the best testimony.
- With regard to plant parasitic nematodes, during the period of study was detected the presence of two parasitic species those cause serious damages in host crops: *Pratylenchus pratensis* Filipjev, 1936 and *Ditylenchus dipsaci* Kühn, 1857, both present in the pretreated wastewater as well as in the outlet of some monitored technologies (Fig. 4)

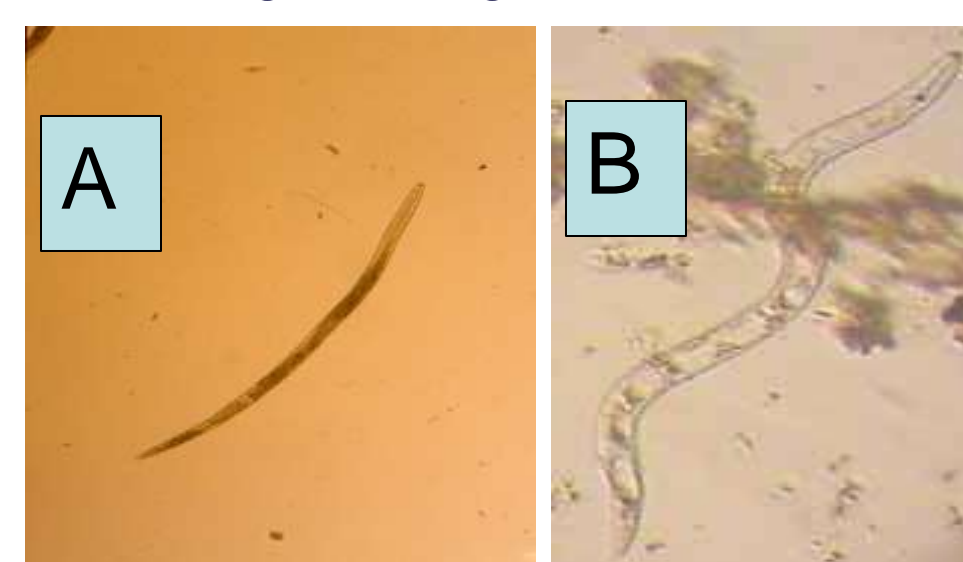


Fig. 4. Illustrations of *Pratylenchus pratensis* (A) and *Ditylenchus dipsaci* (B)

## Conclusions

- All systems present performances of BOD<sub>5</sub>, COD and TSS according with the established values in the European Urban Wastewater Directive (91/271/EC).
- Effluents presents low values of total nematodes.
- Systems allow the development of nematodes and their populations increase.
- Sludge and filters must be kept in mind in the moments of evacuation during cleaning of systems and maintenance to avoid contamination.
- Presence of plant-parasitic nematodes in the outlet of some systems, leads to their consideration on the reuse of treated wastewater on agricultural crops.
- Funds of systems and filters must be kept in mind in the moment of evacuation cleaning and maintenance to avoid contamination.

## References

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