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# THNG NEW Off flavour in recirculated aquaculture systems



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# Introduction

Earthy off-flavour (geosmin) in farmed fish is a global problem of major economic impact for fish farmers and wine producers. Especially in recirculated aquaculture systems (RAS) with low exchange of water it can significantly affect the economy of the farm. Geosmin is a secondary metabolite which is produced by a few

## Results

## Quantification (qPCR) of the bacterial groups in each plant

		geoA g	3 bacterial		
Sample		(% of total k			
	Clade 1	Clade 3	Clade 5	Сус	clades present
Plant 1		0 000920/	0.0240/		in most farms
(Water, outdoor)	0.0052%	0.00083%	0.034%	0.035%	
Plant 1	0 1 4 9/	0.15%	0.0078%	0.0078%	
(Biofilter, outdoor)	0.14%				
Plant 2	0.0060%	0 000930/	0 000220/	0.0140/	<i>geoA</i> containing
(Water, outdoor)	0.0009%	0.00082%	0.00025%	0.014%	bacteria exists in a low amount in RAS, compared to total bacteria
Plant 2	0 020%	0.022%	0.00012%	0.048%	
(Biofilter, outdoor)	0.03970				
Plant 3	0 0017%	0.00%	0.0062%	0.16%	
(Water, indoor)	0.001770				
Plant 3	0 0/7%	0 000/3%	0 00017%	0 0031%	
(Biofilter, indoor)	0.04770	0.0004570	0.0001770	0.003170	Biofilters showed to contain the highest amount
Plant 4	0 0000970/	0.00025%	0.0037%	0.0034%	
(Water, indoor)	0.000087%				
Plant 4	0 00200/	0 210/	0.0160/	0.032%	
(Biofilter, indoor)	0.0028%	0.2170	0.010%		

## organisms containing the geosmin synthetase gene (geoA).



Homology search of the *geoA* has allowed us to identify at least three abundant groups of bacteria that can produce geosmin:

- 1) Actinomycetales (Streptomyces and 5 other clades)
- 2) Freshwater *Cyanobacteria*
- 3) Myxococcales

Quantification were performed by qPCR for the most abundant groups using geoA and the impact on microbial community composition were carried out by amplicon sequencing of the 16S rRNA gene. Relative abundance of geosmin-producing bacteria were evaluated statistically with environmental and operational parameters in aquaculture systems as well as the effect on the entire microbial community.

ot geoA

### **Correlations between environmental factors in the plants**





Sample type	DK	CH	F	NL	
Inflow water	8	5	3	11	Total number of
Outflow water	8	5	3	11	samples analysed > 50
Biofilter	8	3	4	11	

#### Method 1:



#### Method 2:



# Conclusions

Large differences between *geoA*-producing bacteria in plants

geoA containing bacteria was found in low  $\bullet$ amounts in all plants (most abundant in filters)

Several environmental factores correlate positive with geosmin. Such correlations can be used as a diagnostic tool in developing strategies to limit the growth of geosminproducing bacteria.