

The effect of different dosages of BL23 probiotics on off-flavour compounds in Nile tilapia culture ponds

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Abstract

Off-flavour is a major problem that affects the quality of fish products from aquaculture. Though it does not pose a threat to fish health or human health, it upsets the suitability of fish for processing, which ultimately causes resources loss. Metabolites from Actinomycetes and cyanobacteria are two major sources that cause fish and fish products to be tainted with geosmin and 2-MIB. This research investigated the effect of different doses (100gtank⁻¹, 200gtank⁻¹, and 300gtank⁻¹) of *Bacillus licheniformis* strain 23 (BL23) on off-flavour compounds on Nile tilapia cultured in ponds for 8 weeks. At the end of the experiment, the off-flavour concentrations from the treatment groups were significantly lower (p<0.05) compared to the control group. The results suggest the potential of BL23 probiotics to reduce off-flavour concentration in Nile tilapia culture ponds.

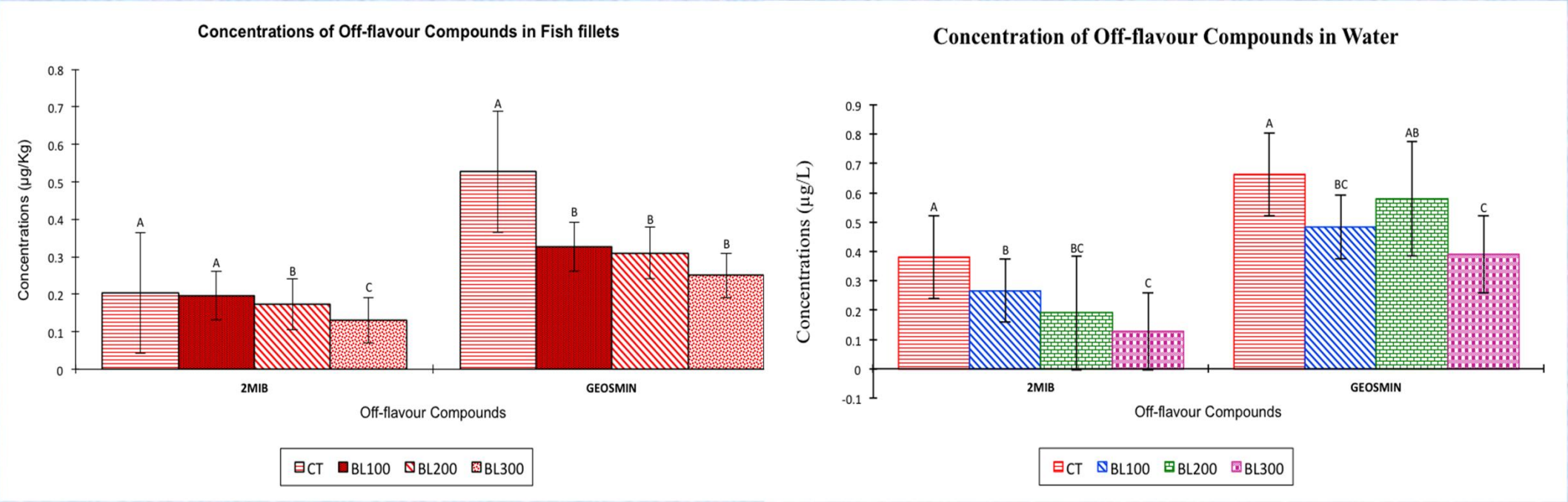
Methodology

Description of Experimental Treatments

Geosmin and 2-MIB were extracted from the fish fillet by Microwave Distillation-Solid-Phase Microextraction, and analyzed by Gas Chromatography-Mass Spectrometer.

	Treatment			
	Group A (CT)	Group B (BL100)	Group C (BL200)	Group D (BL300)
Pond area (m ²)	15	15	15	15
Cage dimension (m ³)	1.5 x 1.5 x 1	1.5 x 1.5 x 1	1.5 x 1.5 x 1	1.5 x 1.5 x 1
Cage depth (m)	1	1	1	1
Water depth (m)	0.6	0.6	0.6	0.6
No. of Nile tilapia stocked	75 ³	75 ³	75 ³	75 ³
Nile tilapia average weight (g)	71.05	71.05	71.05	71.05
Probiotics concentration	N/A	4.5x10 ¹⁰ CFU/g	4.5x10 ¹⁰ CFU/g	4.5x10 ¹⁰ CFU/g
Probiotics dosage	N/A	100g	200g	300g
Feeding rate	Full satiation			

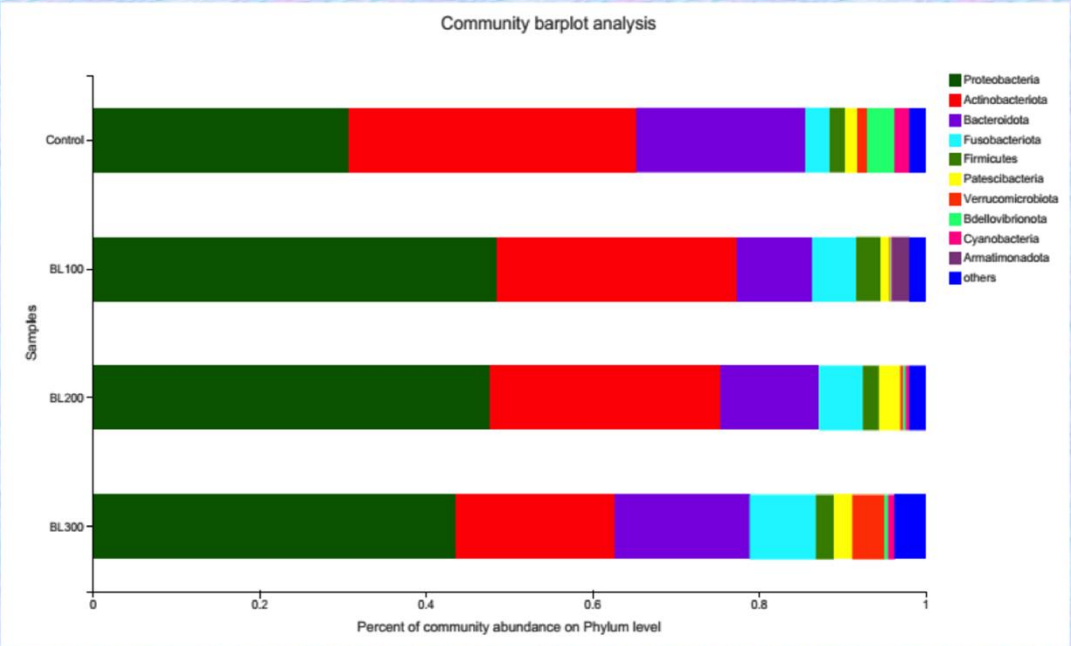
Results & Discussion



Relatively higher levels of geosmin was observed in both water and fish fillet in all groups.

BL23 dose of 300gtank⁻¹ produced the lowest level of off-flavour compounds in the water and fish fillets.

Results & Discussion



The Proteobacteria and Actinobacteria were the most dominant bacteria phyla observed. Members of these phyla are reportedly responsible for the high production off-flavour compounds.

Nile tilapia growth performance and utilisation of feed in the four (4) groups

Parameter	CT	BL100	BL200	BL300
Initial mean weight (g fish ⁻¹)	141.15	141.15	141.15	141.15
Initial number (fish tank ⁻¹)	75	75	75	75
Survival rate (%)	91.46±3.06 ^a	93.04±4.95 ^a	95.76±3.06 ^a	98.93±0.06 ^a
Specific growth rate (% day ⁻¹)	1.38±0.01 ^a	1.63±0.13 ^a	1.05±0.14 ^a	1.48±0.14 ^a
Weight gain (%)	103.85±7.63 ^a	108.85.10±6.37 ^a	233.874±17.14 ^a	193.83±11.27 ^a
Average daily weight gain (g day ⁻¹)	2.35±0.92 ^a	2.51±0.77 ^a	3.54±2.07 ^b	3.25±2.07 ^b
Food conversion rate (kg kg ⁻¹)	1.36±0.01 ^a	1.29±0.03 ^a	1.01±0.13 ^b	1.03±0.04 ^b

Conclusion

Off-flavour compounds and water quality as well fish growth parameters were significantly improved. BL23 probiotics at a dosage of 300g/m3 has proven to be able to reduce off-flavour compounds by inhibiting the microorganisms, Actinobacteria and Cyanobacteria at the concentrations with which this research was designed. Further research that will consider changing aspects of this study especially, different concentrations, frequency or doses is encouraged.