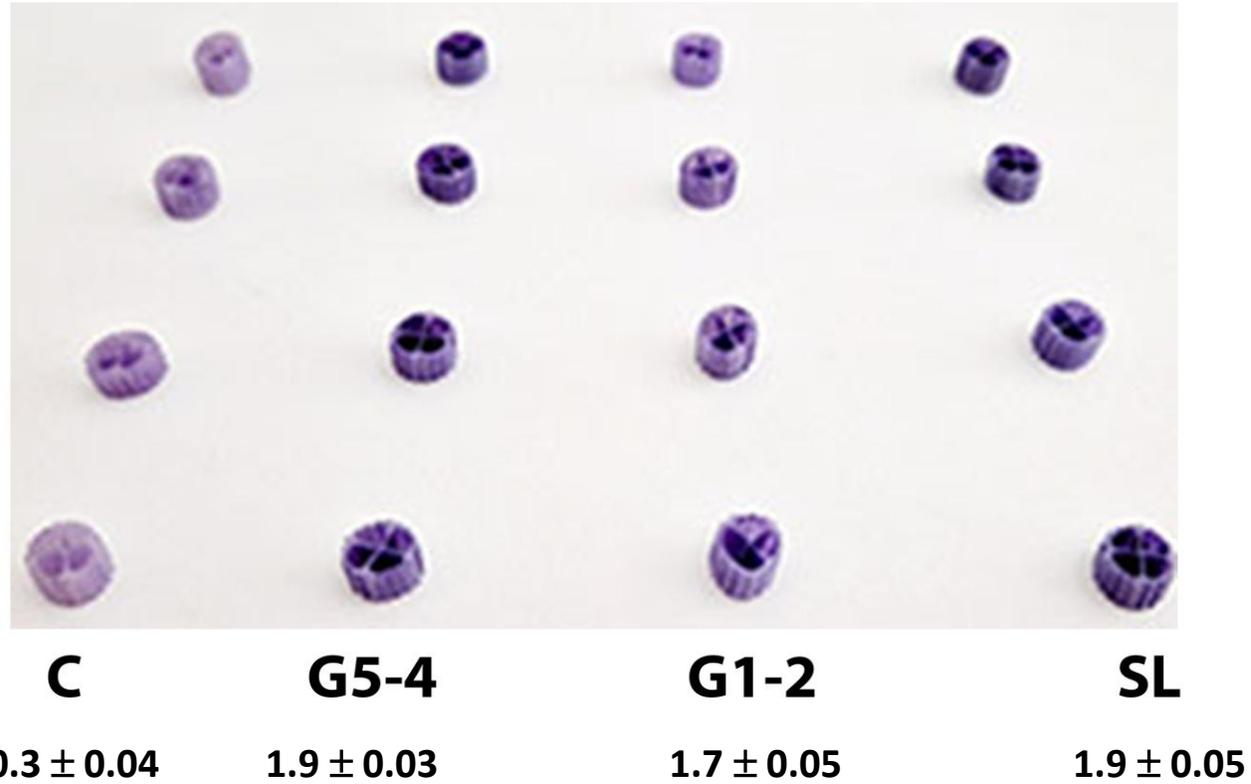
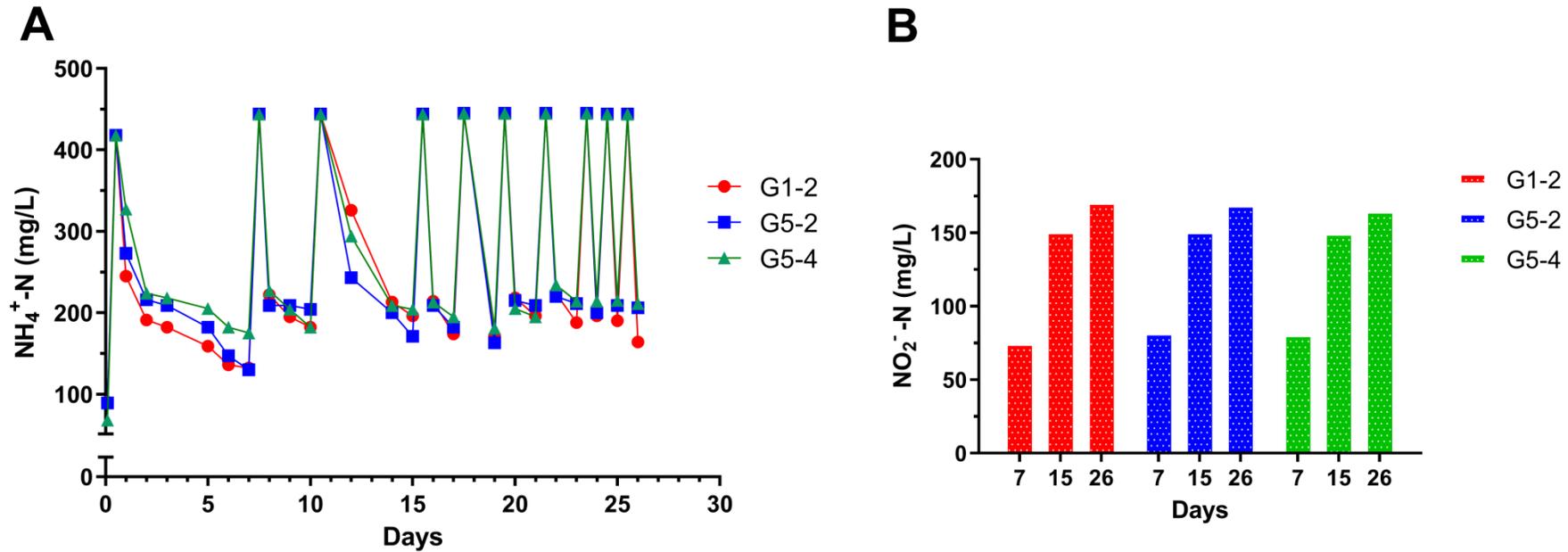


Parameter	Value
Color	Dark brown
Smell	Strong
pH	7.6
COD (mg/L)	4066
BOD (mg/L O <sub>2</sub> )	1207
BOD/COD	0.30
NH <sub>4</sub> <sup>+</sup> -N (mg/L)	1415
NO <sub>3</sub> <sup>-</sup> -N (mg/L)	1.5
NO <sub>2</sub> <sup>-</sup> -N (mg/L)	traces
Cl <sup>-</sup> (mg/L)	3253
Cu (mg/L)	0.061
Pb (mg/L)	0.005
Cr (mg/L)	1.04
Ni (mg/L)	0.234
Zn (mg/L)	0.106

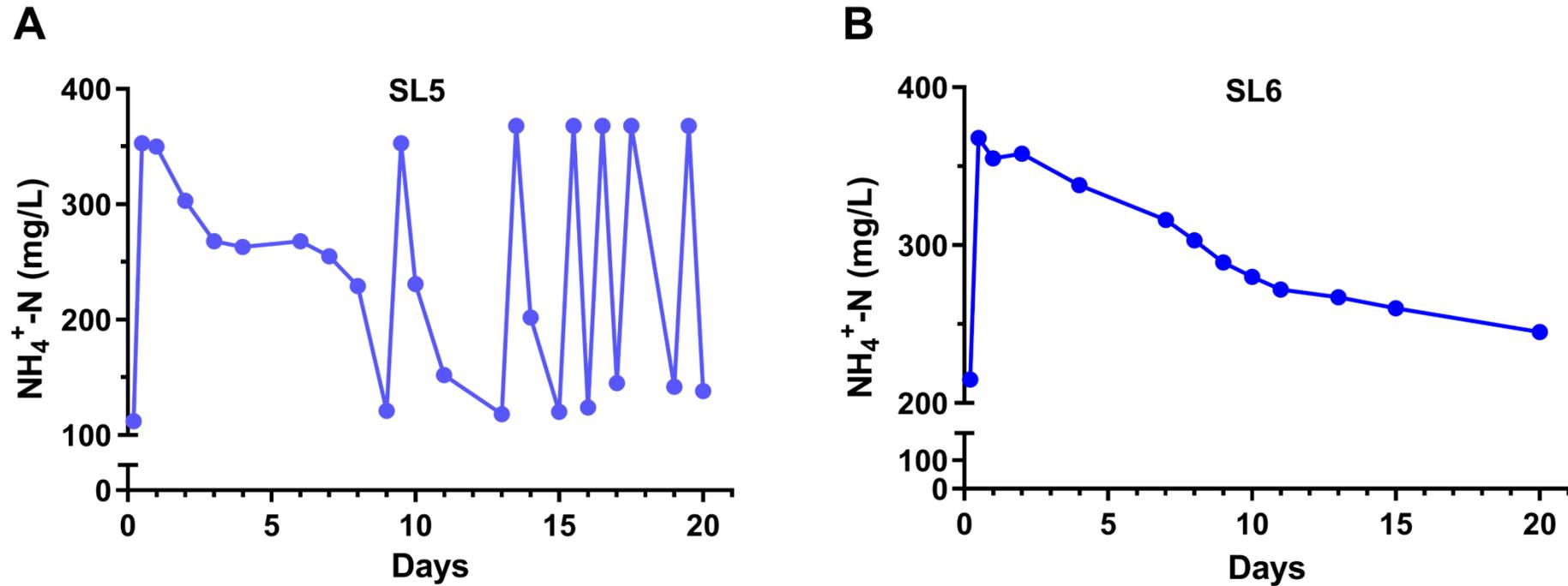
**Table S1. Average composition of pre-treated leachates used in our experiments.**



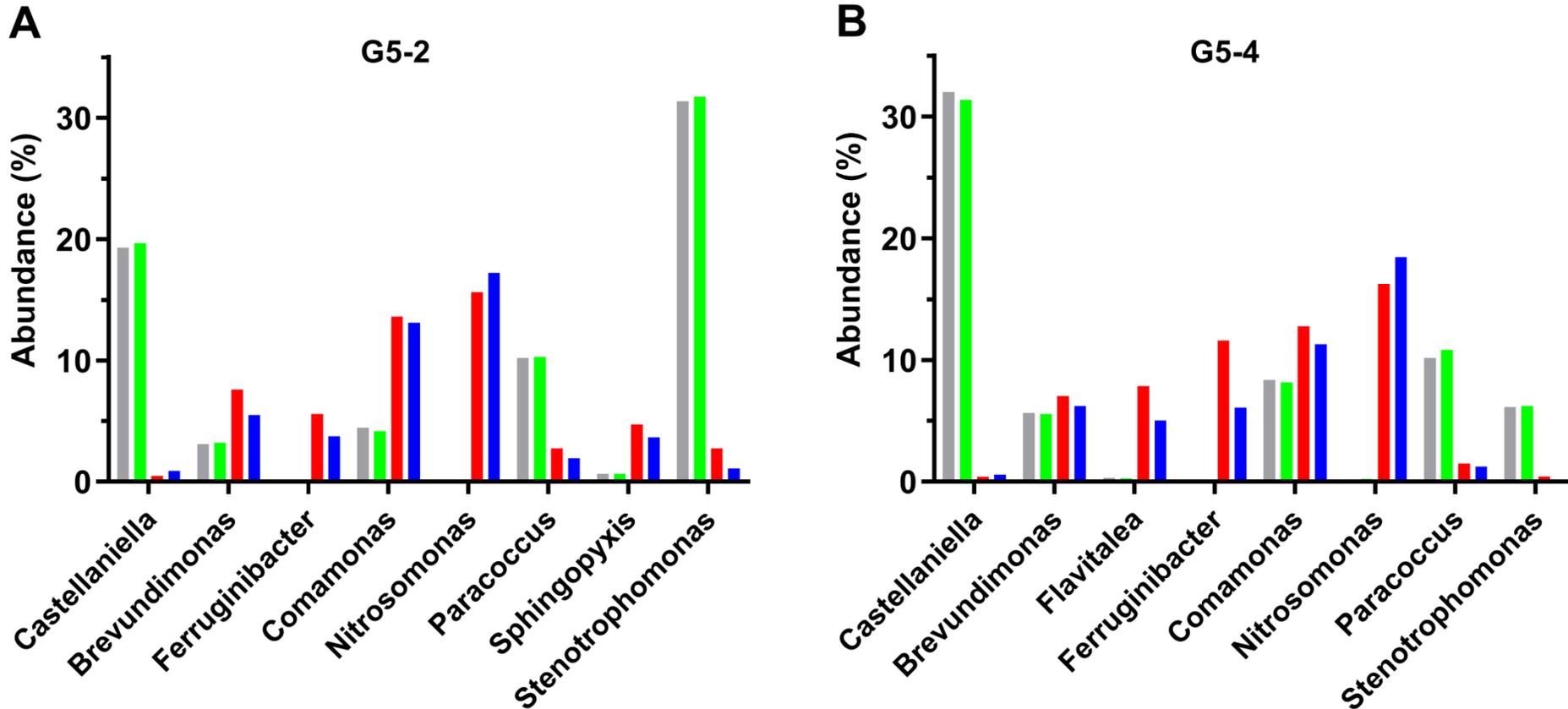
**Figure S1. Crystal Violet Staining.** K1 bio-carriers from control no cells (C), selected bacterial species (G5-4 and G1-2) and activated sludge (SL) were stained with crystal violet dye as described in *Materials and Methods*. The Optical density ( $OD_{600}$ ) of the colored ethanol solution was measured for the four bio-carriers of each sample and the mean  $\pm$  standard deviation are reported.



**Figure S2. Bio-Repetitive Re-Inoculum Assay by G1-2 G5-2 and G5-4 MBBs.** **A.** The experiment has been carried out as described in **Figure 3A** except for the higher  $\text{NH}_4^+\text{-N}$  concentration (425 mg/L). The three biofilms G1-2, G5-2 and G5-4 were tested. **B.** Samples from panel A were withdrawn at indicated times for  $\text{NO}_2^-$  determination.



**Figure S3. Bio-Repetitive Re-Inoculum Assay by sludge MBBs.** Sludge samples SL5 and SL6 were taken at different periods from the Porto Sant'Elpidio municipal WWTP for bio-carriers preparation. The ammonia removal by biofilms were investigated in Bio-RRIA experiments essentially as described in the legend of **Figure 5**.



**Figure S4. Change of biofilm population from ammonia-selected microbial communities.** Relative abundance (%) of the most prevalent genera in the biofilms derived from G5-2 (A) and G5-4 (B) essentially as described in the legend of **Figure 5**. Samples were the bacterial cultures used for biofilm formation (grey bars) and MBBs taken on the 1<sup>st</sup> day (green bars), on the 10<sup>th</sup> day (red bars) and on the 15<sup>th</sup> day (dark blue bars) of Bio-RRIA. The bar graph shows only genera that contributed more than 4% to the total OTUs in at least one point.