Electronic Supplementary Information

Spectrochemical analyses of growth phase-related bacterial responses to low (environmentally relevant) concentrations of tetracycline and nanoparticulate silver

Naifu Jin[1], Kirk T. Semple[1], Longfei Jiang[2], Chunling Luo[2], Dayi Zhang[1,3,*], Francis L. Martin[4,*]

[1]*Lancaster Environment Centre, Lancaster University, Lancaster LA1 4YQ, UK;*

[2]*Guangzhou Institute of Geochemistry, Chinese Academy of Sciences, Guangzhou 510640, China;*

[3]*School of Environment, Tsinghua University, Beijin 100084, China;*

[4]*School of Pharmacy and Biomedical Sciences, University of Central Lancashire, Preston PR1 2HE, UK;*

*Corresponding authors:

Francis L Martin, School of Pharmacy and Biomedical Sciences, University of Central Lancashire, Preston PR1 2HE, UK; Email: flmartin@uclan.ac.uk

Dayi Zhang, School of Environment, Tsinghua University, Beijin 100084, China; Email: d.zhang@lancaster.ac.uk

Table S1. Growth impact under each treatment (*M. vanbaalenii* PYR-1)

Treatment	Control	AgNP	Tetracycline	Binary
P-value	*P* <0.0001	*P* <0.0001	*P* <0.0001	*P* <0.0001
Are means significantly different? (*P* <0.05)	Yes	Yes	Yes	Yes
Paired-group comparison	Significant?	Significant?	Significant?	Significant?
Log *vs.* Stationary	Yes (****)	Yes (****)	Yes (****)	Yes (****)
Log *vs.* Death	Yes (****)	Yes (****)	Yes (****)	Yes (****)
Stationary *vs.* Death	Yes (****)	Yes (****)	Yes (****)	Yes (****)

One-way analysis of variance (ANOVA) with Tukey's post hoc test.

Table S2. Growth impact under each treatment (*P. fluorescens*)

Treatment	Control	AgNP	Tetracycline	Binary
P-value	*P* <0.0001	*P* <0.0001	*P* <0.0001	*P* <0.0001
Are means significantly different? (*P* <0.05)	Yes	Yes	Yes	Yes
Paired-group comparison	Significant?	Significant?	Significant?	Significant?
Log *vs.* Stationary	Yes (****)	Yes (****)	Yes (****)	Yes (****)
Log *vs.* Death	Yes (****)	Yes (****)	Yes (****)	Yes (****)
Stationary *vs.* Death	Yes (****)	Yes (****)	Yes (****)	Yes (****)

One-way analysis of variance (ANOVA) with Tukey's post hoc test.

Table S3. Treatment impact in each growth phase (*M. vanbaalenii* PYR-1)

Growth phase	Exponential	Stationary	Death
P-value	*P* <0.0001	*P* <0.0001	*P* <0.0001
Are means significantly different? (*P* <0.05)	Yes	Yes	Yes
One- or two-tailed *P*-value?	Two-tailed	Two-tailed	Two-tailed
Paired-group comparison	Significant?	Significant?	Significant?
Control *vs.* Silver	Yes (****)	Yes (****)	Yes (****)
Control *vs.* Tet	Yes (****)	Yes (****)	Yes (****)
Sliver *vs.* Tet	Yes (****)	Yes (****)	Yes (****)
Control *vs.* Binary	Yes (****)	Yes (****)	Yes (****)

One-way analysis of variance (ANOVA) with Tukey's post hoc test.

Table S4. Treatment impact in each growth phase (*P. fluorescens*).

Growth phase	Exponential	Stationary	Death
P-value	*P* <0.0001	*P* <0.0001	*P* <0.0001
Are means significantly different? (*P* <0.05)	Yes	Yes	Yes
One- or two-tailed *P*-value?	Two-tailed	Two-tailed	Two-tailed
Paired-group comparison	Significant?	Significant?	Significant?
Control *vs.* Silver	Yes (****)	Yes (****)	Yes (****)
Control *vs.* Tet	Yes (****)	Yes (****)	Yes (****)
Sliver *vs.* Tet	Yes (****)	Yes (****)	Yes (****)
Control *vs.* Binary	Yes (****)	Yes (****)	Yes (****)

One-way analysis of variance (ANOVA) with Tukey's post hoc test.