Table S1. Antimicrobial susceptibility profiles of *A. xylosoxidans* isolates.

Isolate	Bacteria	Site	Amikacin	Gentamicin	Tobramycin	Imipenem	Meropenem	Cefepime	Ceftazidime	Ciprofloxacin	Levofloxacin	Aztreonam	Piperacillin / Tazobactam	Trimethoprim / Sulfamethoxazole	Classification[a]
AX02	A. xylosoxidans	Urine	R	R	N/A	N/A	N/A	R	S	R	N/A	R	S	S	MDR
AX05	A. xylosoxidans	N/A	R	R	R	S	N/A	R	N/A	R	S	R	S	S	MDR
AX08	A. xylosoxidans	Catheter Tip	R	R	R	N/A	N/A	I	S	R	N/A	R	S	S	MDR
AX10	A. xylosoxidans	CF respiratory	R	R	R	N/A	N/A	R	R	R	N/A	R	S	S	MDR
AX11	A. xylosoxidans	Respiratory Sputum	R	R	R	N/A	N/A	R	R	R	N/A	R	S	S	MDR
AX12	A. xylosoxidans	Respiratory Sputum	R	R	R	N/A	S	R	S	R	N/A	R	S	N/A	MDR
AX13	A. xylosoxidans	Urine	R	R	R	N/A	N/A	R	S	I	N/A	R	S	S	MDR
AX14	A. xylosoxidans	Respiratory Sputum	R	R	R	S	R	R	S	R	N/A	R	S	S	MDR
AX15	A. xylosoxidans	Respiratory Sputum	R	R	R	N/A	N/A	R	R	R	N/A	R	S	S	MDR
AX19	A. xylosoxidans	HM-235, reference strain	R	R	R	S	N/A	R	N/A	R	R	R	S	S	MDR
AX23	A. xylosoxidans	Right Leg Drainage	R	R	R	N/A	N/A	R	S	R	S	R	S	S	MDR
AX25	A. xylosoxidans	Respiratory Sputum	R	R	R	S	S	R	R	R	R	R	R	S	MDR
AX27	A. xylosoxidans	Blood	R	R	R	N/A	N/A	I	S	I	S	R	S	S	MDR
AX28	A. xylosoxidans	Respiratory Sputum	R	R	R	S	S	R	R	R	R	R	R	S	MDR
AX29	A. xylosoxidans	Tracheal Aspirate	R	R	R	N/A	N/A	R	S	R	S	R	S	S	MDR
AX33	A. xylosoxidans	Respiratory Sputum	R	R	R	N/A	N/A	R	R	I	S	R	S	S	MDR
AX34	A. xylosoxidans	Leg tissue	R	R	R	S	N/A	R	S	R	I	R	S	S	MDR
AX36	A. xylosoxidans	Respiratory Sputum	R	R	R	N/A	N/A	S	S	R	S	R	S	S	MDR
AX38	A. xylosoxidans	Bronchoscopy washings	R	R	R	N/A	N/A	R	S	R	S	R	S	S	MDR
AX39	A. xylosoxidans	Blood	R	R	R	S	N/A	R	N/A	I	S	I	S	S	MDR

AX41	A. xylosoxidans	Urine, Catheter	R	R	R	N/A	N/A	R	R	R	R	R	S	S	MDR
AX42	A. xylosoxidans	Right leg Drainage	R	R	R	N/A	N/A	S	S	I	S	R	S	S	MDR
AX44	A. xylosoxidans	Bronchoscopy washings	R	R	R	N/A	N/A	S	S	R	S	R	R	S	MDR
AX46	A. xylosoxidans	Respiratory sputum	S	S	S	S	S	I	S	I	I	R	S	S	MDR
AX47	A. xylosoxidans	Respiratory sputum	R	R	R	N/A	N/A	I	I	I	I	R	S	S	MDR
AX48	A. xylosoxidans	Bronchoscopy washings	R	R	R	N/A	N/A	R	S	R	R	R	S	S	MDR
AX50	A. xylosoxidans	Respiratory sputum	R	R	R	S	N/A	R	N/A	R	R	N/A	S	S	MDR
AX52	A. xylosoxidans	Respiratory sputum	R	R	R	N/A	N/A	S	S	I	S	R	S	S	MDR
AX55	A. xylosoxidans	Blood	R	R	R	S	N/A	R	S	R	I	R	S	S	MDR
AX57	A. xylosoxidans	Blood	R	R	R	S	N/A	R	N/A	R	S	R	S	S	MDR
AX01	A. xylosoxidans	Respiratory sputum	R	R	R	N/A	N/A	R	I	R	N/A	R	S	S	XDR
AX07	A. xylosoxidans	Maxilla	R	R	R	N/A	N/A	R	I	R	N/A	R	S	S	XDR
AX09	A. xylosoxidans	Respiratory sputum	R	R	R	N/A	N/A	R	I	R	N/A	R	S	S	XDR
AX16	A. xylosoxidans	Respiratory sputum	R	R	N/A	N/A	R	R	R	N/A	R	R	R	R	XDR
AX20	A. xylosoxidans	Respiratory sputum	R	R	R	S	R	R	R	R	R	R	S	R	XDR
AX21	A. xylosoxidans	Throat	R	R	R	S	R	R	R	R	R	R	S	R	XDR
AX22	A. xylosoxidans	Respiratory sputum	R	R	R	S	R	R	R	R	R	R	R	R	XDR
AX24	A. xylosoxidans	Respiratory sputum	R	R	R	S	R	R	I	R	R	R	I	R	XDR
AX30	A. xylosoxidans	Respiratory sputum	R	R	R	R	R	R	I	R	R	R	S	R	XDR
AX31	A. xylosoxidans	Respiratory sputum	R	R	R	N/A	N/A	R	I	R	R	R	S	S	XDR
AX32	A. xylosoxidans	Respiratory sputum	R	R	R	R	R	R	S	R	R	R	S	R	XDR
AX35	A. xylosoxidans	Respiratory sputum	R	R	R	N/A	N/A	R	I	R	S	R	S	S	XDR

AX37	A. xylosoxidans	Peritoneal Fluid	R	R	R	N/A	N/A	R	S	R	I	R	S	S	XDR
AX40	A. xylosoxidans	Respiratory sputum	R	R	R	N/A	N/A	R	I	R	R	R	S	S	XDR
AX43	A. xylosoxidans	Respiratory sputum	R	R	R	N/A	N/A	R	I	R	S	R	S	S	XDR
AX45	A. xylosoxidans	Respiratory sputum	R	R	R	N/A	N/A	R	S	R	I	R	S	S	XDR
AX49	A. xylosoxidans	Eye-conjuntiva	R	R	R	R	R	R	S	R	I	R	I	S	XDR
AX51	A. xylosoxidans	Respiratory sputum	R	R	R	N/A	N/A	R	S	R	I	R	I	S	XDR
AX53	A. xylosoxidans	Tracheal Aspirate	R	R	R	N/A	N/A	R	R	I	S	R	I	S	XDR
AX54	A. xylosoxidans	Respiratory sputum	R	R	R	S	R	R	S	R	I	R	S	S	XDR
AX56	A. xylosoxidans	Respiratory sputum	R	R	R	N/A	N/A	I	S	R	I	R	S	S	XDR

[a]Susceptibility to antimicrobial agents is shown as R (resistant), I (intermediate), or S (susceptible). 23 isolates were classified as multidrug-resistant (MDR), i.e., resistant to at most the total number of antimicrobial categories minus two, and the remaining isolates as extensively drug-resistant (XDR), i.e., non-susceptible to all but two or fewer categories (susceptible to only one or two categories).

Table S2. Achromobacter phages with available genome data in the NCBI Taxonomy database.

Phage name	Genome length (bp)	Gene Bank ID	Phage name	Genome length (bp)	Gene Bank ID
Kuwaak_TL2	46215	3076825	vB_AxyS_19-32_Axy18	45500	2591052
Hasilly_LB3	46478	3076824	vB_AxyS_19-32_Axy16	46178	2591051
Ewik_TL4	50543	3076823	vB_AxyS_19-32_Axy14	46703	2591050
Ehaak_LB5	46435	3076822	vB_AxyS_19-32_Axy06	45830	2591049
Tuull	47460	3074846	vB_AxyP_19-32_Axy24	74744	2591048
JWT	46410	3070119	vB_AxyP_19-32_Axy23	43773	2591047
2-1	82711	3061295	vB_AxyP_19-32_Axy22	71710	2591046
Shaaii LB_5	45029	3043593	vB_AxyP_19-32_Axy21	43049	2591045
Nyashin_LB6	45982	3043592	vB_AxyP_19-32_Axy13	70103	2591044
Nyaak_TL1	46478	3043591	vB_AxyP_19-32_Axy12	74096	2591043
Maay_LB1	46086	3043590	vB_AxyP_19-32_Axy11	73413	2591042
Kwar_LB4	33215	3043589	vB_AxyP_19-32_Axy10	73898	2591041
Ewii_LB8	43305	3043587	vB_AxyP_19-32_Axy09	43049	2591040
Emuu_LB7	46012	3043586	vB_AxyP_19-32_Axy04	73834	2591039
SE2	45648	3043584	vB_Ade_ART	95343	2292880
CF419P1	58030	3043583	phiAxp-3	72825	1664247
AXY1	61950	2884451	phiAxp-2	62220	1664246
vB_AchrS_Ach V4	59489	2796514	phiAxp-1	45045	1610509
Mano	42452	2767570	JWF	81541	1589748
AMA2	45901	2723727	83-24	48216	1589747
AMA1	46328	2723726	JWX	49714	1589746
Motura	221431	2591403	JWAlpha	72329	1416009
vB_AxyS_19-32_Axy20	46352	2591054	JWDelta	73659	1416008
vB_AxyS_19-32_Axy19	46036	2591053			

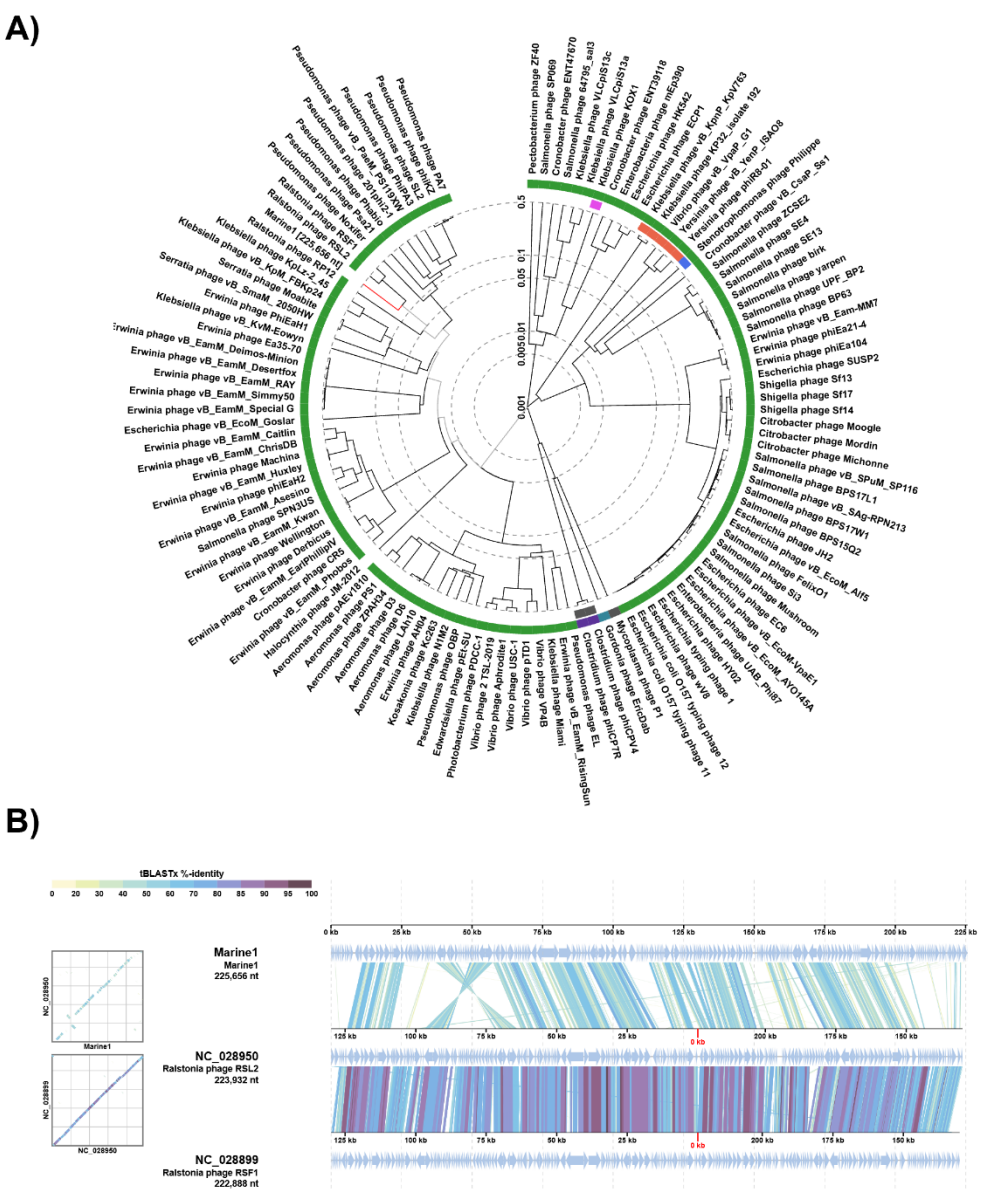

Figure S1. Jumbo phage Marine1 phylogenetic relationships. A) Phage Proteomic Tree including related phages to phage Marine1. B) Genome maps of closest relatives to Marine1.

Figure S2. Phage-Antibiotics-Synergy between meropenem and phages BuckLyse, Kaach or Taco in *Achromobacter xylosoxidans* AX19. Multiplicity Of Infection of 0.1, 1 and 10 were tested; meropenem concentrations between 64 mcg/mL to 1/64 mcg/mL were tested in liquid media at 37°C over 24 hours. Percentage growth was calculated relative to the no-treatment (A-C), meropenem breakpoints are shown with a red-dotted line. Representative growth curves (D-F). Differences in percentage growth over antibiotic concentrations at MOI of 1 (G-I), significant thresholds are shown as p ≤ 0.05 (*), p ≤ 0.01 (**), p ≤ 0.001 (***), p>0.05 not significant and not shown.

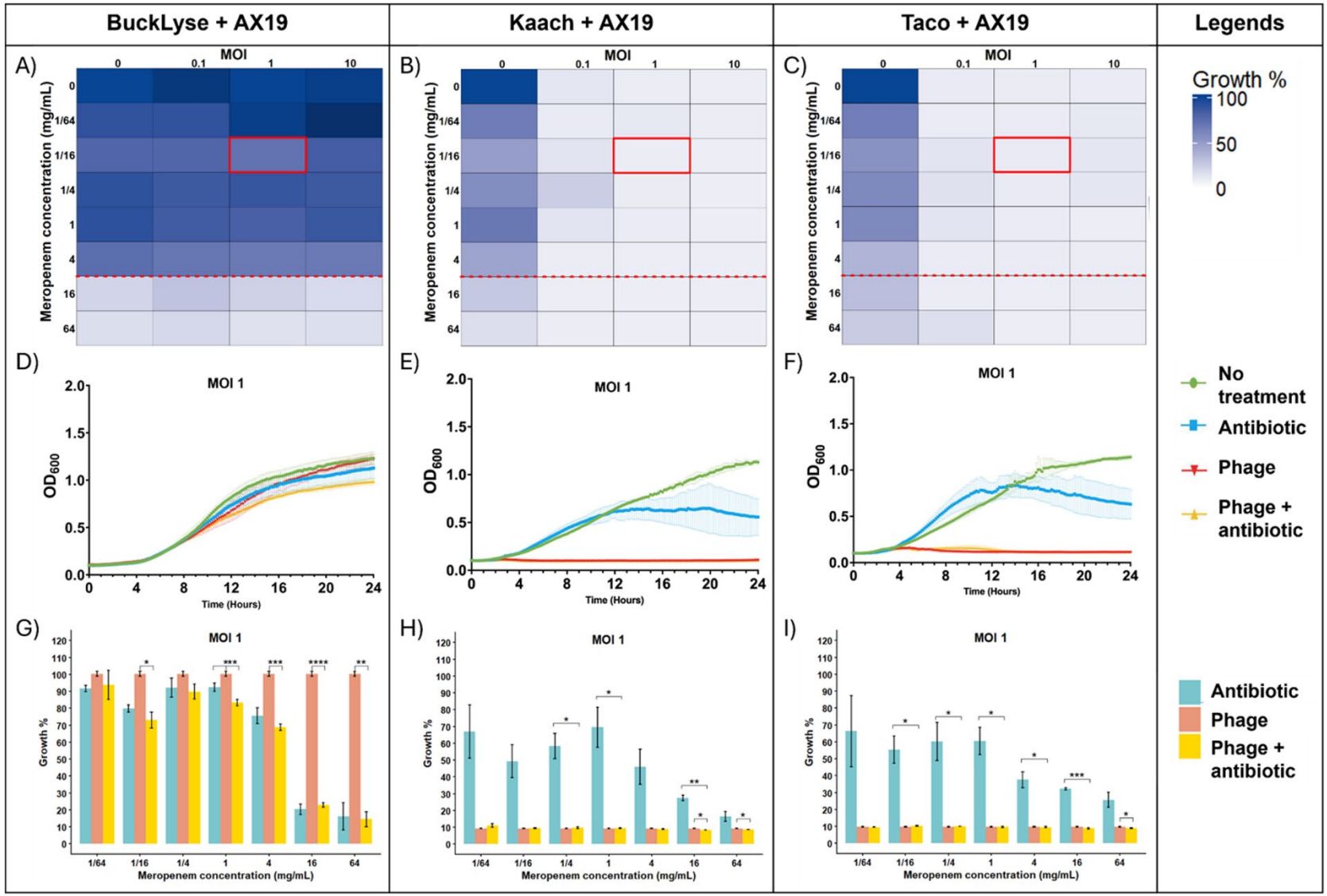

Figure S3. Phage-Antibiotics-Synergy between ceftazidime and phages BuckLyse, Kaach or Taco in *Achromobacter xylosoxidans* AX31. Multiplicity Of Infection of 0.1, 1 and 10 were tested; ceftazidime concentrations between 64 mcg/mL to 1/64 mcg/mL were tested in liquid media at 37°C over 24 hours. Percentage growth was calculated relative to the no-treatment (A-C), ceftazidime breakpoints are shown with a red-dotted line. Representative growth curves (D-F). Differences in percentage growth over antibiotic concentrations at MOI of 1 (G-I), significant thresholds are shown as $p \leq 0.05$ (*), $p \leq 0.01$ (**), $p \leq 0.001$ (***), $p>0.05$ not significant and not shown

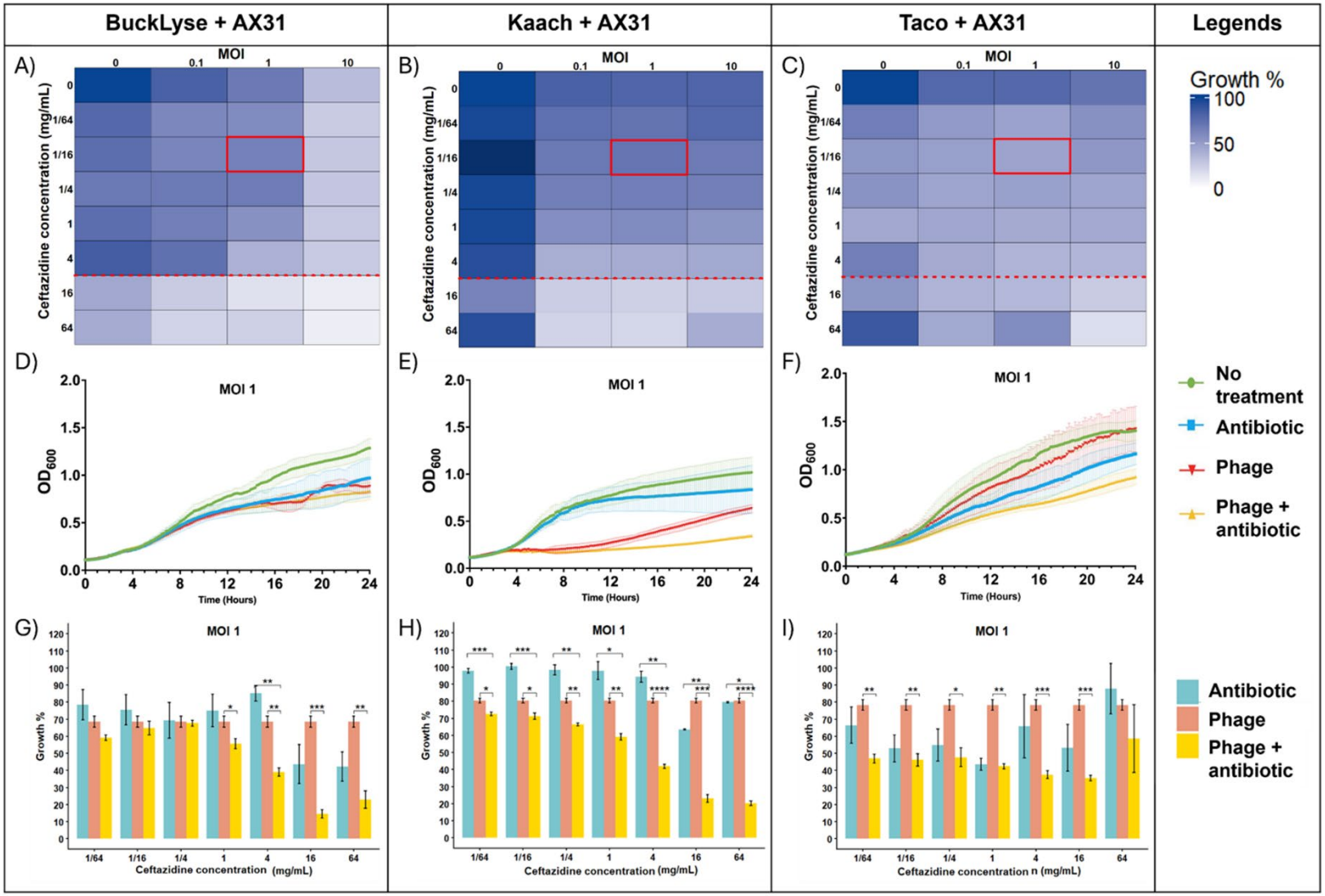

Figure S4. Phage-Antibiotics-Synergy between ceftazidime and phages BuckLyse, Kaach or Taco in *Achromobacter xylosoxidans* AX19. Multiplicity Of Infection of 0.1, 1 and 10 were tested; ceftazidime concentrations between 64 mcg/mL to 1/64 mcg/mL were tested in liquid media at 37°C over 24 hours. Percentage growth was calculated relative to the no-treatment (A-C), ceftazidime breakpoints are shown with a red-dotted line. Representative growth curves (D-F). Differences in percentage growth over antibiotic concentrations at MOI of 1 (G-I), significant thresholds are shown as p ≤ 0.05 (*), p ≤ 0.01 (**), p ≤ 0.001 (***), p>0.05 not significant and not shown.

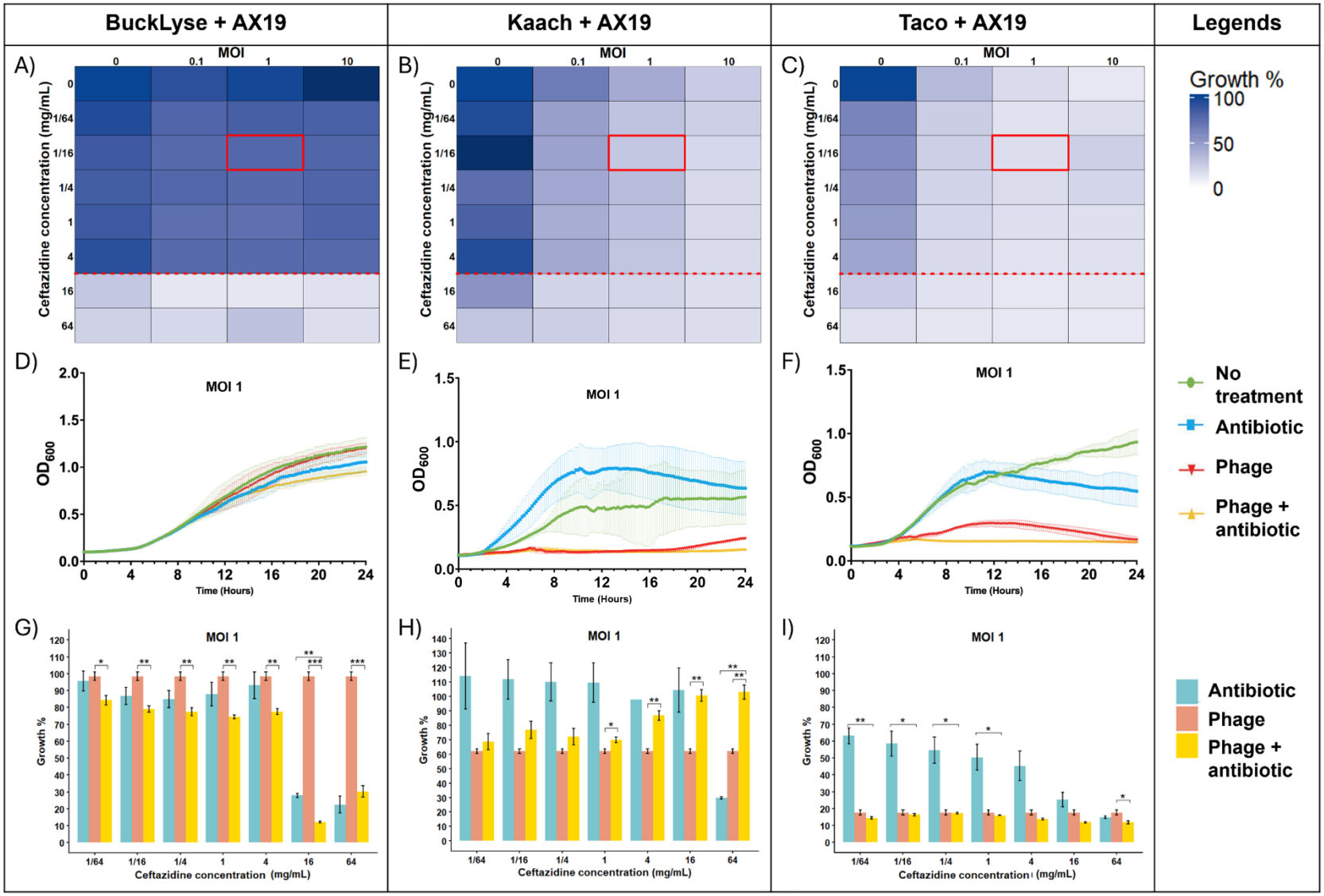

Figure S5. Phage-Antibiotics-Synergy between trimethoprim-sulfamethoxazole and phages BuckLyse, Kaach or Taco in *Achromobacter xylosoxidans* AX31. Multiplicity Of Infection of 0.1, 1 and 10 were tested; tmp/sulfa concentrations between 64 mcg/mL to 1/64 mcg/mL were tested in liquid media at 37°C over 24 hours. Percentage growth was calculated relative to the no-treatment (A-C), tmp/sulfa breakpoints are shown with a red-dotted line. Representative growth curves (D-F). Differences in percentage growth over antibiotic concentrations at MOI of 1 (G-I), significant thresholds are shown as $p \leq 0.05$ (*), $p \leq 0.01$ (**), $p \leq 0.001$ (***), $p>0.05$ not significant and not shown.

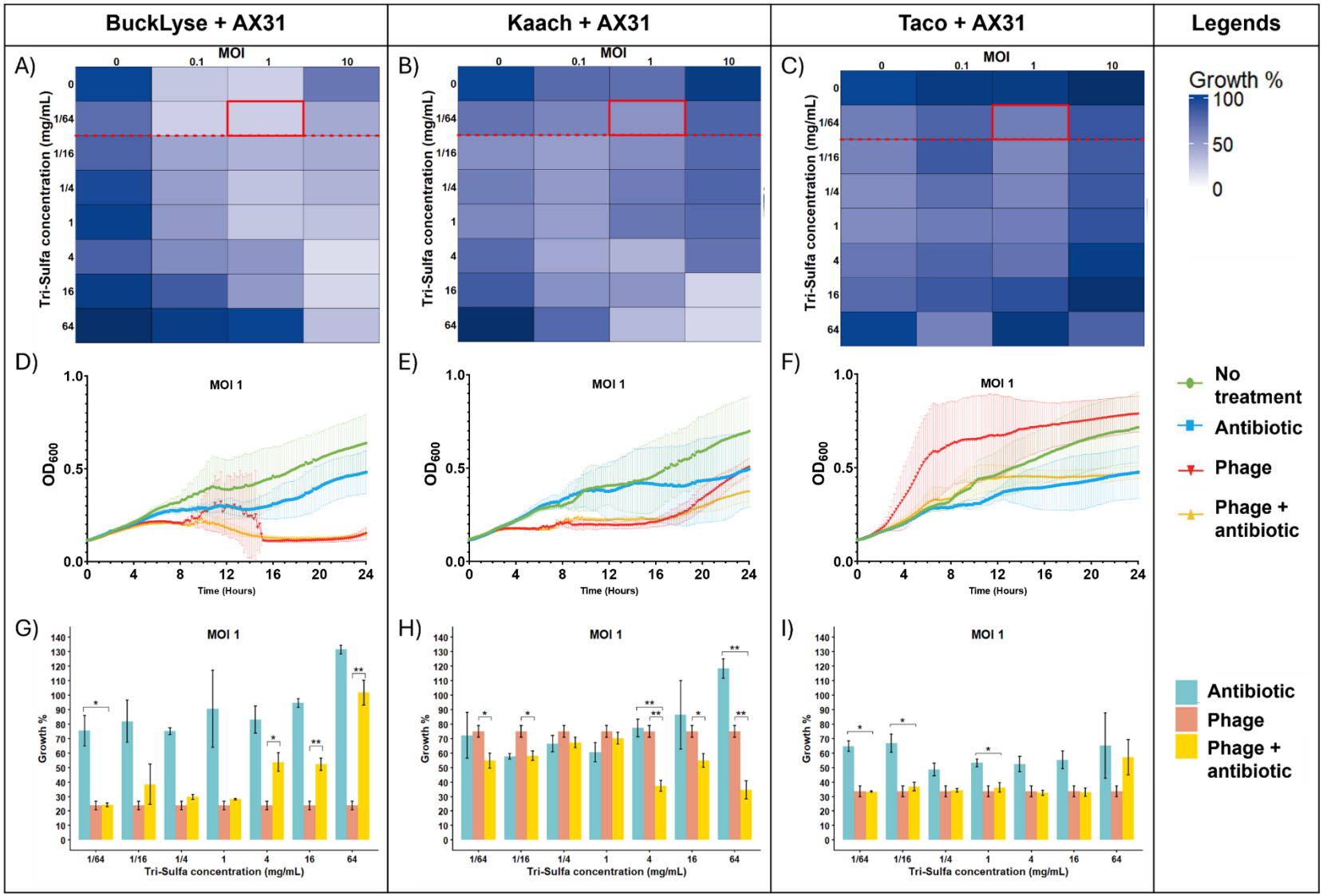

Figure S6. Phage-Antibiotics-Synergy between trimethoprim-sulfamethoxazole and phages BuckLyse, Kaach or Taco in *Achromobacter xylosoxidans* AX19. Multiplicity Of Infection of 0.1, 1 and 10 were tested; tmp/sulfa concentrations between 64 mcg/mL to 1/64 mcg/mL were tested in liquid media at 37°C over 24 hours. Percentage growth was calculated relative to the no-treatment (A-C), tmp/sulfa breakpoints are shown with a red-dotted line. Representative growth curves (D-F). Differences in percentage growth over antibiotic concentrations at MOI of 1 (G-I), significant thresholds are shown as p ≤ 0.05 (*), p ≤ 0.01 (**), p ≤ 0.001 (***), p>0.05 not significant and not shown.

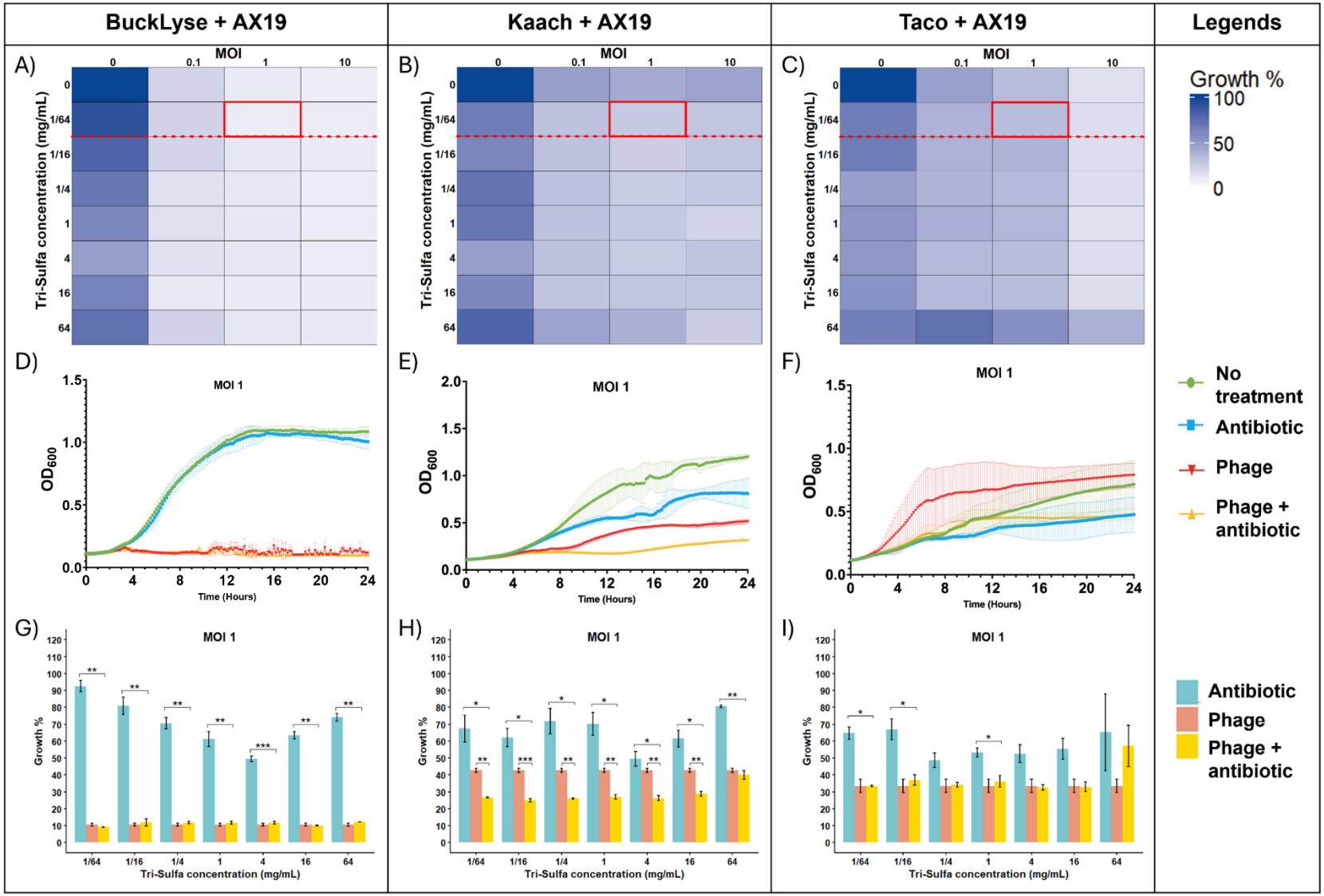

Figure S7. Phage-Antibiotics-Synergy between levofloxacin and phages BuckLyse, Kaach or Taco in *Achromobacter xylosoxidans* AX31. Multiplicity Of Infection of 0.1, 1 and 10 were tested; levofloxacin concentrations between 64 mcg/mL to 1/64 mcg/mL were tested in liquid media at 37°C over 24 hours. Percentage growth was calculated relative to the no-treatment (A-C), levofloxacin breakpoints are shown with a red-dotted line. Representative growth curves (D-F). Differences in percentage growth over antibiotic concentrations at MOI of 1 (G-I), significant thresholds are shown as p ≤ 0.05 (*), p ≤ 0.01 (**), p ≤ 0.001 (***), p>0.05 not significant and not shown.

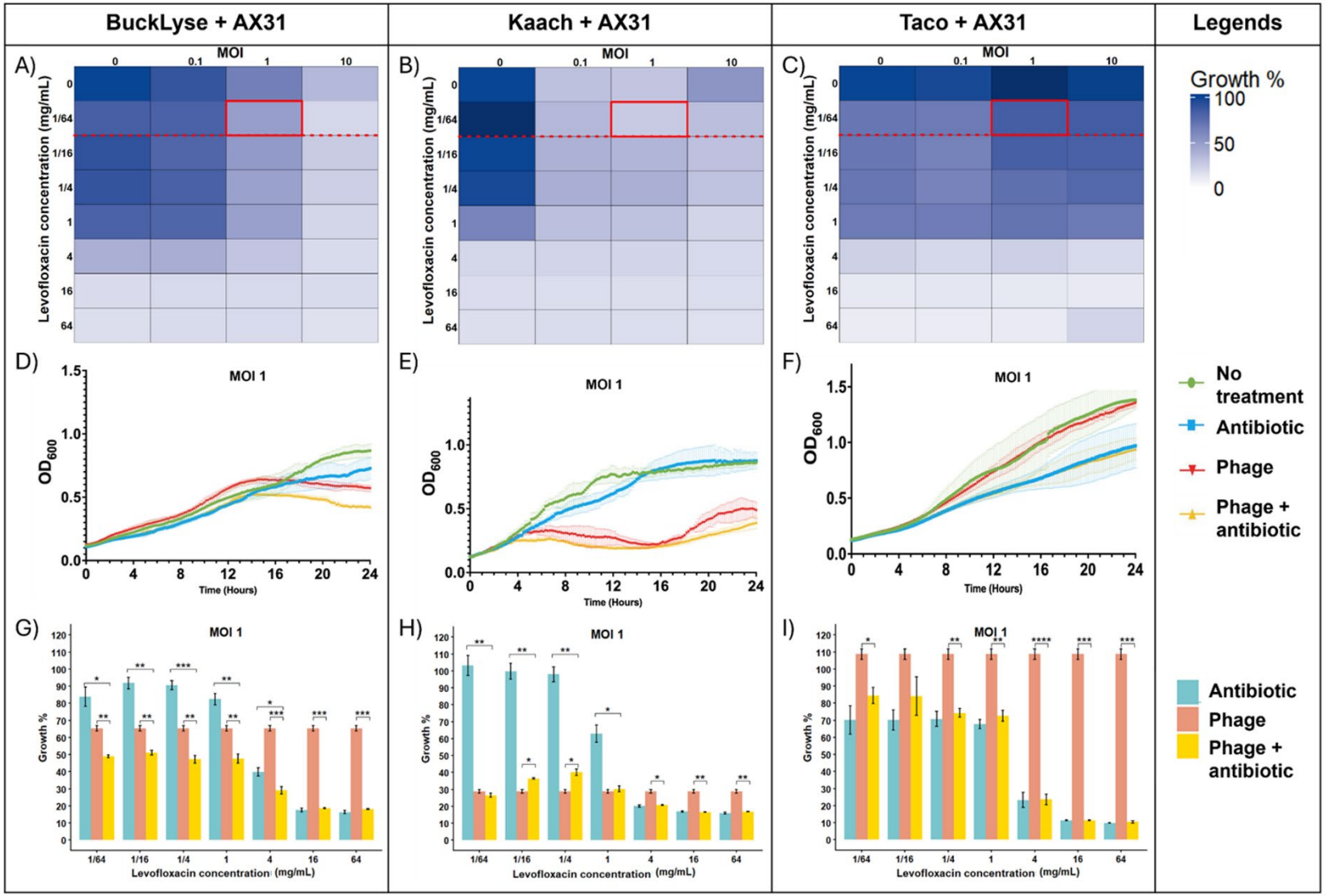

Figure S8. Phage-Antibiotics-Synergy between levofloxacin and phages BuckLyse, Kaach or Taco in *Achromobacter xylosoxidans* AX19. Multiplicity Of Infection of 0.1, 1 and 10 were tested; levofloxacin concentrations between 64 mcg/mL to 1/64 mcg/mL were tested in liquid media at 37°C over 24 hours. Percentage growth was calculated relative to the no-treatment (A-C), levofloxacin breakpoints are shown with a red-dotted line. Representative growth curves (D-F). Differences in percentage growth over antibiotic concentrations at MOI of 1 (G-I), significant thresholds are shown as p ≤ 0.05 (*), p ≤ 0.01 (**), p ≤ 0.001 (***), p>0.05 not significant and not shown.