Electronic Supplementary Material (ESI) for Environmental Science: Water Research & Technology.

ONLINE SUPPLEMENTAL INFORMATION

QUANTIFYING THE EFFICACY OF DIQUAT DIBROMIDE IN CONTROLLING MICROCYSTIS AERUGINOSA AND APHANIZOMENON FLOS-AQUAE IN COMPARISON TO COPPER SULFATE AND POTASSIUM PERMANGANATE

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Table S1. Physio-chemical analysis conducted at the end of the *Microcystis aeruginosa* experiment
Reading are reported as the average of three readings

Parameter	*Initial*	*End of experiment (96 hrs)*								
		Control	*$CuSO_4$*				*$KMnO_4$*			*Diquat*	
			0.2mg/L	*0.5mg/L*	*0.8mg/L*	*1 mg/L*	*1mg/L*	*2mg/L*	*3mg/L*	*0.5mg/L*	*1mg/L*
Turbidity (NTU)	130.4	124.3	57.7	30.1	23.9	51.4	230.0	166.3	114	29.5	39.2
Calcium Hardness (mg/L)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total Hardness (mg/L)	1.1	1.1	1.1	1.1	1.1	1.2	1.1	1.1	1.1	1.1	1.1
PO^{3-}_4 (mg/L)	2.5	1.3	2.2	>2.5	>2.5	>2.5	1.0	1.7	0.3	0.3	0.3
NO^{2-} (mg/L)	0.4	0.1	0.1	0.1	0.1	0.02	0.1	0.1	0.1	0.1	0.1
NO^{3-} (mg/L)	18.8	4.7	17.8	17.7	17.0	15.3	8	13.0	13.5	11.7	17.4

Table S2. Physio-chemical analysis conducted at the end of the *Aphanizomenon flos-aquae* experiment
Reading are reported as the average of three readings

Parameter	*Initial*	*End of experiment (96 hrs)*								
		Control	*$CuSO_4$*				*$KMnO_4$*			*Diquat*	
			0.2mg/L	*0.5mg/L*	*0.8mg/L*	*1 mg/L*	*1mg/L*	*2mg/L*	*3mg/L*	*0.5mg/L*	*1mg/L*
Turbidity (NTU)	160	16.1	9.0	22.9	27.6	43.8	7.6	20.2	22.7	12.4	10.0
Calcium Hardness (mg/L)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Total Hardness (mg/L)	0.7	0.7	0.8	0.7	0.7	0.7	0.7	-	0.7	0.7	0.7
PO^{3-}_4 (mg/L)	11.7	3.2	14.1	5.4	4.4	3.7	3.4	3.0	15.60	2.4	2.8
NO^{2-} (mg/L)	0.3	1.9	0.2	0.3	0.3	0.4	1.7	4.4	1.3	8.8	3.4
NO^{3-} (mg/L)	0.8	4.5	1.1	1.3	1.0	2.3	4.1	4.4	2.9	6.8	4.0

Table S3 Statistical analysis (two-way ANOVA) of *Microcystis* and *Aphanizomenon* reductions following $CuSO_4$ treatment as a function of dose and exposure time

	ANOVA F-static (p-value)			**Pairwise comparison (Tukey)**											
	Dosage	**Time**	**Interaction**	**Dosage (mg/L)**						**Time (hrs)**					
					0	0.2	0.5	0.8	1		0	24	48	72	96
Microcystis	118.47 (<0.05)	112.63 (<0.05)	11.38 (<0.05)	0		✔	✔	✔	✔	0		✔	✔	✔	✔
				0.2			✔	✔	✔	24			✔	✔	✖
				0.5				✔	✔	48				✖	✔
				0.8					✖	72					✔
				1.0						96					
	ANOVA F-static (p-value)			**Pairwise comparison (Tukey)**											
	Dosage	**Time**	**Interaction**	**Dosage (mg/L)**						**Time (hrs)**					
					0	0.2	0.5	0.8	1		0	24	48	72	96
Aphanizomenon	26.415 (<0.05)	263.779 (<0.05)	2.589 (<0.05)	0		✔	✔	✔	✔	0		✔	✔	✔	✔
				0.2			✖	✔	✔	24			✔	✔	✔
				0.5				✖	✖	48				✔	✔
				0.8					✖	72					✖
				1.0						96					

✔ significance at the 95% confidence interval (p-value <0.05)

✖ No significance at the 95% confidence interval (p-value >0.05)

Table S4 Statistical analysis (two-way ANOVA) of *Microcystis* and *Aphanizomenon* reductions following $KMnO_4$ treatment as a function of dose and exposure time

	ANOVA F-static (p-value)			**Pairwise comparison (Tukey)**											
	Dosage	**Time**	**Interaction**	**Dosage (mg/L)**						**Time (hrs)**					
					0	1	2	3			0	24	48	72	96
Microcystis	17.565 (<0.05)	8.061 (<0.05)	4.226 (<0.05)	0		✖	✖	✔		0		✖	✔	✔	✖
				1			✖	✔		24			✔	✖	✖
				2				✔		48				✖	✖
				3						72					✖
										96					
	ANOVA F-static (p-value)			**Pairwise comparison (Tukey)**											
	Dosage	**Time**	**Interaction**	**Dosage (mg/L)**						**Time (hrs)**					
					0	1	2	3			0	24	48	72	96
Aphanizomenon	33.740 (<0.05)	179.013 (<0.05)	3.569 (<0.05)	0		✖	✔	✔		0		✔	✔	✔	✔
				1			✔	✔		24			✔	✔	✔
				2				✖		48				✖	✔
				3						72					✖
										96					

✔ significane p-value <0.05

✖ not Significant P-value >0.05

Table S5 Statistical analysis (two-way ANOVA) of *Microcystis* and *Aphanizomenon* reductions following Diquat treatment as a function of dose and exposure time

	ANOVA F-static (p-value)			Pairwise comparison (Tukey)											
	Dosage	Time	Interaction	Dosage (mg/L)						Time (hrs)					
Diquat *Microcystis*	55.17 (<0.05)	205.02 (<0.05)	25.10 (<0.05)		0	1	2				0	24	48	72	96
				0		✔	✔			0		✔	✔	✔	✔
				1			✖			24			✔	✔	✔
				2						48				✖	✖
										72					✖
										96					
	ANOVA F-static (p-value)			**Pairwise comparison (Tukey)**											
	Dosage	**Time**	**Interaction**	**Dosage (mg/L)**						**Time (hrs)**					
Diquat *Aphanizomenon*	32.47 (<0.05)	198.90 (<0.05)	3.82 (<0.05)		0	0.25	0.5	1			0	24	48	72	96
				0		✔	✔	✔		0		✔	✔	✔	✔
				0.5				✖		24			✔	✔	✔
				1						48				✖	✖
										72					✖
										96					

✔ significane p-value <0.05

✖ not Significant P-value >0.05

Table S6 Residual levels of algaecides in samples of *Microcystis* and *Aphanizomenon* after 96 hrs of exposure

		Microcystis	***Aphanizomenon***
Copper Cu^{2+} (mg/L)	$CuSO_4$ 0.2mg/L	0.197	0.125
	$CuSO_4$ 0.5mg/L	0.449	0.179
	$CuSO_4$ 0.8mg/L	0.662	0.226
	$CuSO_4$ 1 mg/L	0.733	0.245
Permanganate Mn^{2+} (mg/L)	$KMnO_4$ 1mg/L	0.162	0.154
	$KMnO_4$ 2mg/L	0.309	0.232
	$KMnO_4$ 3mg/L	0.149	0.312
Diquat (mg/L)	Diquat 0.5mg/L	0.239	0.284
	Diquat 1mg/L	0.593	0.603

*Values recorded are averages of the triplicates measured on 96 hrs