

Figure S1: Photos of untreated seedlings at the end of experiments for a) common buckwheat and b) Tartary buckwheat. Length of red scale bar indicate 1 cm.

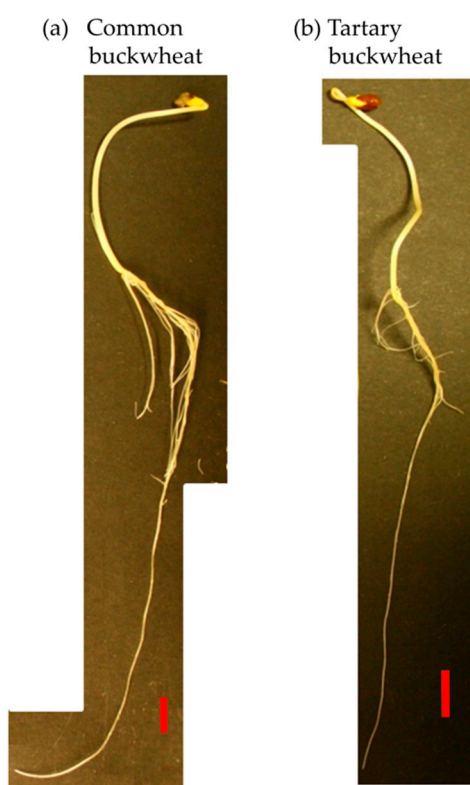
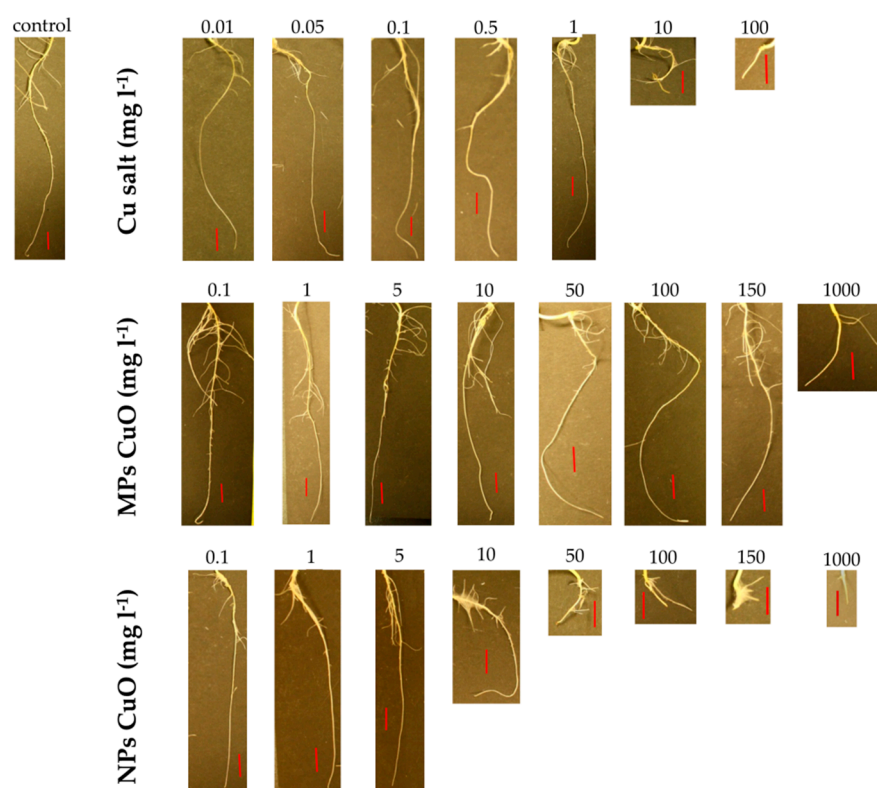


Figure S2: Photos of roots exposed to different copper treatments for a) common buckwheat and b) Tartary buckwheat. Length of red scale bar indicate 1 cm. Legend: control – untreated seedlings, Cu salt – $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$; MPs CuO – CuO microparticles, NPs CuO – CuO nanoparticles.

(a) Common buckwheat



(b) Tartary buckwheat

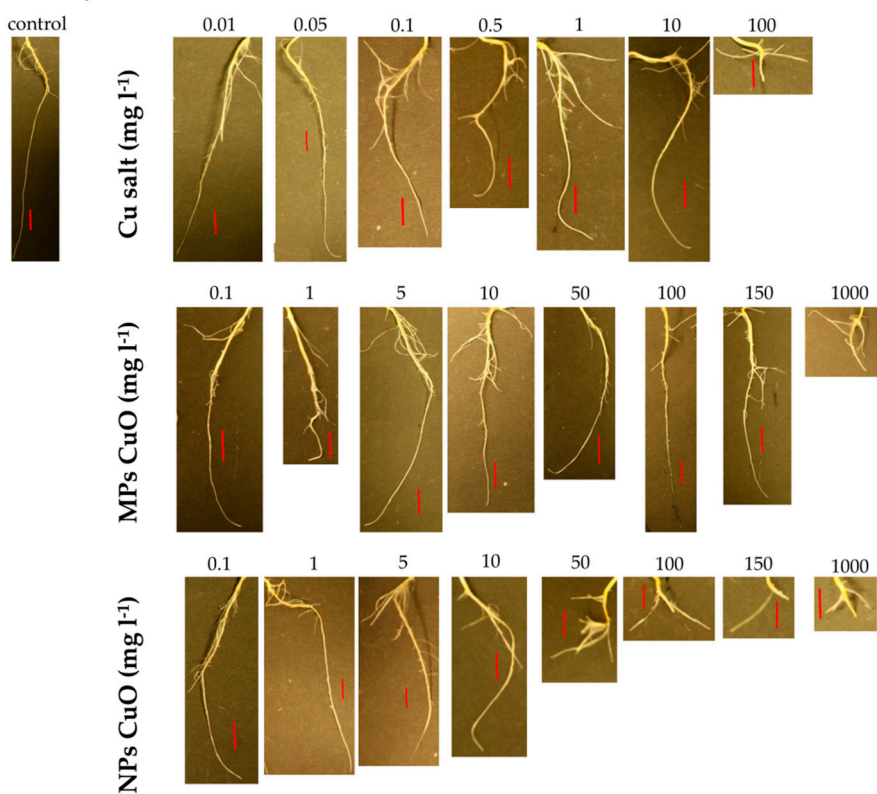


Table S1: Impact of different factors, buckwheat species, Cu form, Cu concentration and their interactions on measured parameters of common and Tartary buckwheat seeds and seedlings responses. Results are represented as p-values (factorial ANOVA), where numbers represent the statistically significant influence of factor on the selected variable ($p < 0.05$).

Factor	Germination 1 st day	Germination 8 th day	Fresh weight	Root length	Phenols	Flavonoids	Tannins	Total
Buckwheat species	0.1033	0.0172	0.0000	0.0002	0.0000	0.0000	0.1162	5
Cu form	0.0082	0.9765	0.0146	0.0000	0.0000	0.0619	0.0003	5
Cu concentration	0.1033	0.5400	0.0000	0.0000	0.0011	0.5415	0.6424	3
Buckwheat species * Cu form	0.0000	0.6388	0.0110	0.0144	0.0100	0.0008	0.0234	6
Buckwheat species * Cu concentration	0.4641	0.5400	0.0207	0.9470	0.2200	0.2224	0.4118	1
Cu form * Cu concentration	0.2434	0.0968	0.0000	0.0001	0.0181	0.9604	0.2193	3
Buckwheat species * Cu form * Cu concentration	0.0666	0.0511	0.7081	0.8303	0.0512	0.6718	0.6616	0

Table S2: Average (means \pm ster) of raw values (% dry weight) and cumulative differences of all treatments of same Cu compound in comparison to control (%) for measurements of total phenols, flavonoids and tannins in common and Tartary buckwheat. Legend: control – untreated seedlings, Cu salt – CuSO₄ · 5H₂O; MPs - CuO microparticles, NPs – CuO nanoparticles.

Treatment		Common buckwheat			Tartary buckwheat		
Cu compound	concentration (mg l ⁻¹)	Phenols	Flavonoids	Tannins	Phenols	Flavonoids	Tannins
control	0	1.33 \pm 0.05	0.52 \pm 0.03	0.28 \pm 0.02	2.6 \pm 0.04	2.73 \pm 0.09	0.36 \pm 0.02
Cu salt	0.01	1.6 \pm 0.07	0.65 \pm 0.04	0.28 \pm 0.01	2.63 \pm 0.06	2.79 \pm 0.02	0.33 \pm 0.02
Cu salt	0.05	1.7 \pm 0.04	0.65 \pm 0.03	0.33 \pm 0.02	2.57 \pm 0.1	2.65 \pm 0.03	0.34 \pm 0.03
Cu salt	0.1	1.75 \pm 0.07	0.69 \pm 0.01	0.35 \pm 0.01	2.86 \pm 0.04	2.67 \pm 0.03	0.38 \pm 0.02
Cu salt	0.5	1.8 \pm 0.04	0.68 \pm 0.02	0.37 \pm 0.01	2.87 \pm 0.08	2.8 \pm 0.13	0.32 \pm 0.01
Cu salt	1	1.68 \pm 0.04	0.7 \pm 0.02	0.33 \pm 0	2.57 \pm 0.07	2.73 \pm 0.07	0.32 \pm 0.01
Cu salt	10	1.79 \pm 0.03	0.63 \pm 0.01	0.3 \pm 0.02	2.58 \pm 0.05	2.67 \pm 0.03	0.31 \pm 0.02
Cu salt	100	1.37 \pm 0.04	0.63 \pm 0.02	0.29 \pm 0.02	2.51 \pm 0.09	2.63 \pm 0.06	0.29 \pm 0.01
Salt average difference to control (%)		25.4 \pm 4.2	26.7 \pm 2.1	15.1 \pm 2.8	2.2 \pm 2.2	-0.9 \pm 0.9	-9.3 \pm 2.1
MPs	0.1	1.74 \pm 0.07	0.67 \pm 0.02	0.33 \pm 0.03	2.51 \pm 0.09	2.54 \pm 0.05	0.32 \pm 0.01
MPs	1	1.69 \pm 0.08	0.72 \pm 0.02	0.32 \pm 0.02	2.62 \pm 0.03	2.62 \pm 0.04	0.34 \pm 0.02
MPs	5	1.98 \pm 0.04	0.72 \pm 0.03	0.36 \pm 0.05	2.69 \pm 0.07	2.72 \pm 0.06	0.37 \pm 0.01
MPs	10	2.06 \pm 0.09	0.74 \pm 0.02	0.36 \pm 0.01	2.76 \pm 0.09	2.8 \pm 0.08	0.35 \pm 0.02
MPs	50	2.01 \pm 0.11	0.72 \pm 0.06	0.36 \pm 0.02	2.67 \pm 0.03	2.69 \pm 0.05	0.36 \pm 0.02
MPs	100	1.71 \pm 0.09	0.72 \pm 0.04	0.37 \pm 0.02	2.76 \pm 0.04	2.59 \pm 0.05	0.33 \pm 0.02
MPs	150	1.95 \pm 0.07	0.7 \pm 0.04	0.36 \pm 0.02	2.64 \pm 0.06	2.54 \pm 0.02	0.35 \pm 0.01
MPs	1000	1.63 \pm 0.09	0.67 \pm 0.03	0.33 \pm 0.01	2.58 \pm 0.08	2.61 \pm 0.05	0.32 \pm 0.01
MPs average difference to control (%)		38.6 \pm 4.5	35.4 \pm 1.8	25.3 \pm 1.8	2 \pm 1.2	-3.3 \pm 1.2	-5.5 \pm 1.6
NPs	0.1	1.52 \pm 0.12	0.74 \pm 0.03	0.37 \pm 0.04	2.7 \pm 0.07	2.53 \pm 0.04	0.34 \pm 0.01
NPs	1	1.76 \pm 0.03	0.75 \pm 0.04	0.33 \pm 0.04	2.64 \pm 0.09	2.57 \pm 0.06	0.29 \pm 0.01
NPs	5	1.94 \pm 0.07	0.78 \pm 0.03	0.37 \pm 0.02	2.81 \pm 0.08	2.63 \pm 0.06	0.32 \pm 0.02
NPs	10	1.97 \pm 0.06	0.77 \pm 0.03	0.41 \pm 0.02	2.62 \pm 0.08	2.55 \pm 0.06	0.31 \pm 0.01
NPs	50	1.82 \pm 0.04	0.84 \pm 0.01	0.44 \pm 0.04	2.66 \pm 0.05	2.56 \pm 0.04	0.33 \pm 0.01
NPs	100	1.52 \pm 0.09	0.8 \pm 0.04	0.4 \pm 0.01	2.56 \pm 0.04	2.57 \pm 0.04	0.28 \pm 0.02
NPs	150	1.53 \pm 0.07	0.75 \pm 0.04	0.37 \pm 0.01	2.44 \pm 0.03	2.54 \pm 0.04	0.3 \pm 0.01
NPs	1000	1.63 \pm 0.09	0.77 \pm 0.03	0.42 \pm 0.03	2.13 \pm 0.07	2.62 \pm 0.05	0.34 \pm 0.02
NPs average difference to control (%)		28.4 \pm 5	48.7 \pm 2.1	39.5 \pm 2.3	-1.1 \pm 2.8	-5.9 \pm 0.5	-13.9 \pm 2.1

Table S3: Barlett's test for eigenvalue significance and variables/factor correlations for a) common buckwheat and b) Tartary buckwheat in discriminant analyses.

(a) Common buckwheat				(b) Tartary buckwheat			
Barlett's test	F1	F2	F3	Barlett's test	F1	F2	F3
Eigenvalue	1.417	0.368	0.127	Eigenvalue	0.960	0.127	0.026
Bartlett's statistic	465.852	153.435	42.478	Bartlett's statistic	289.694	51.382	8.958
p-value	0.000	0.000	0.000	p-value	0.000	0.000	0.062

Variables/factor correlation	F1	F2	F3	Variables/factor correlation	F1	F2	F3
germination 1 st day	-0.062	0.703	-0.641	germination 1 st day	-0.908	0.272	0.148
fresh weight	-0.479	0.493	-0.048	fresh weight	0.139	0.616	0.188
root length	-0.519	0.527	0.334	root length	0.377	0.470	-0.017
phenols	0.257	0.724	0.566	phenols	0.191	0.229	0.785
flavonoids	0.864	0.087	0.185	flavonoids	0.559	0.036	0.469
tannins	0.634	0.038	-0.151	tannins	0.297	0.787	-0.102