

Supporting Information for

**Rice Exposure to Silver Nanoparticles in a Life Cycle
Study: Biphasic Dose-Responses on Grain
Metabolomic Profile, Yield, and Soil Bacteria**

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Table S1. Ag content in rice tissues (mg/kg dry weight)

	Control	1 mg/kg AgNPs	10 mg/kg AgNPs
Polished grain	1.38 ± 0.32	0.98 ± 0.10	1.10 ± 0.14
Bran	1.16 ± 0.22	1.16 ± 0.23	3.86 ± 1.83
Rice hull	1.50 ± 0.46	3.12 ± 1.13*	4.70 ± 1.75*
Leaf	1.55 ± 0.50	1.78 ± 0.61	1.86 ± 0.31
Stem	0.67 ± 0.19	1.26 ± 0.19*	2.98 ± 1.16*
Root	5.68 ± 0.78	14.40 ± 4.31*	29.24 ± 14.77*

All data are averages of 4 replicates. *represent statistical difference at $p < 0.05$

Table S2. Mineral nutrient content in polished rice grain (mg/kg dry weight)

	Control	1 mg/kg AgNPs	10 mg/kg AgNPs
K	208.5 ± 4.18	169.0 ± 33.17	168.1 ± 8.64*
Ca	219.6 ± 32.89	193.9 ± 68.82	199.9 ± 41.90
Mg	262.6 ± 57.43	242.1 ± 50.76	279.0 ± 9.10
Fe	77.04 ± 11.84	58.48 ± 8.72*	64.40 ± 12.27
Zn	15.69 ± 3.11	11.50 ± 3.11	11.86 ± 2.84
Mn	9.49 ± 0.94	10.72 ± 3.35	9.62 ± 1.50
Cu	7.90 ± 1.69	6.28 ± 0.75	7.23 ± 0.14
Mo	1.07 ± 0.20	0.73 ± 0.11*	0.91 ± 0.22

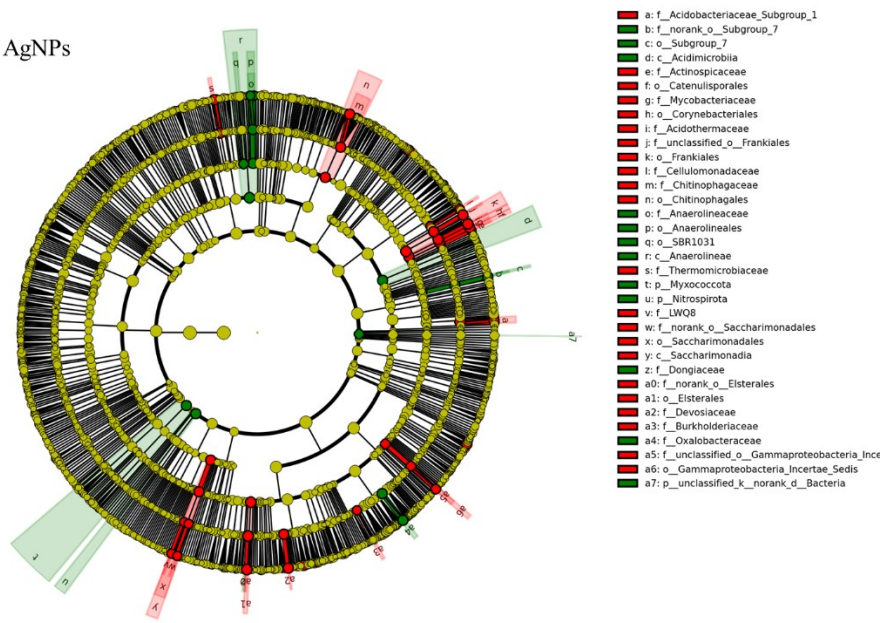
All data are averages of 4 replicates. *represent statistical difference at $p < 0.05$

VIP	Overlap	T-test
Ethylene glycol	1,2,4-benzenetriol	2-monoolein
Glutaric acid	2,4-hexadienedioic acid	3-fluoro-2-hydroxyprop-2-enoate
Hydrocinnamic acid	3-deoxyhexitol	Arachidic acid
L-arabitol	4-(4-hydroxyphenyl)-4-methyl-2-pentanone	Dodecanol
Linolenic acid	Adipic acid	Glycolic acid
Sorbitol	Behenic acid	Guanosine
1-heptanol	Benzylalcohol	Isocitric acid
1-kestose	Cellobiose	Isomaltose
3-hydroxymethylglutaric acid	Citric acid	Lauric acid
D-arabinose	L-cysteine-glycine	Octanol
Gluconic acid	Metharbital	Quinic acid
Glutathione	Naproxen	Terephthalic acid
Glycocyamine	Ribonic acid	3,4-dihydroxycinnamic acid
L-asparagine	Thymine	Chlorogenic acid
L-tryptophan	Beta-hydroxymyristic acid	D-mannose
L-tyrosine	Citraconic acid	Fumaric acid
Salicylaldehyde	Citrazinic	Phenylalanine
Udp-glucuronic acid	D-myo-inositol 4-phosphate	Sophorose
	Itaconic acid	Uracil
	L-proline	
	Maleic acid	
	Palatinitol	

Figure S1. Up- and Down- regulated metabolites upon exposure to 1 mg/kg AgNPs. Red and green represent up- and down- regulation of metabolites respectively. The results are the combination of non-variate t-test analysis ($p < 0.05$) and top 40 discriminant metabolites screened by VIP score from PLS-DA model.

A

Control
1 mg/kg AgNPs



B

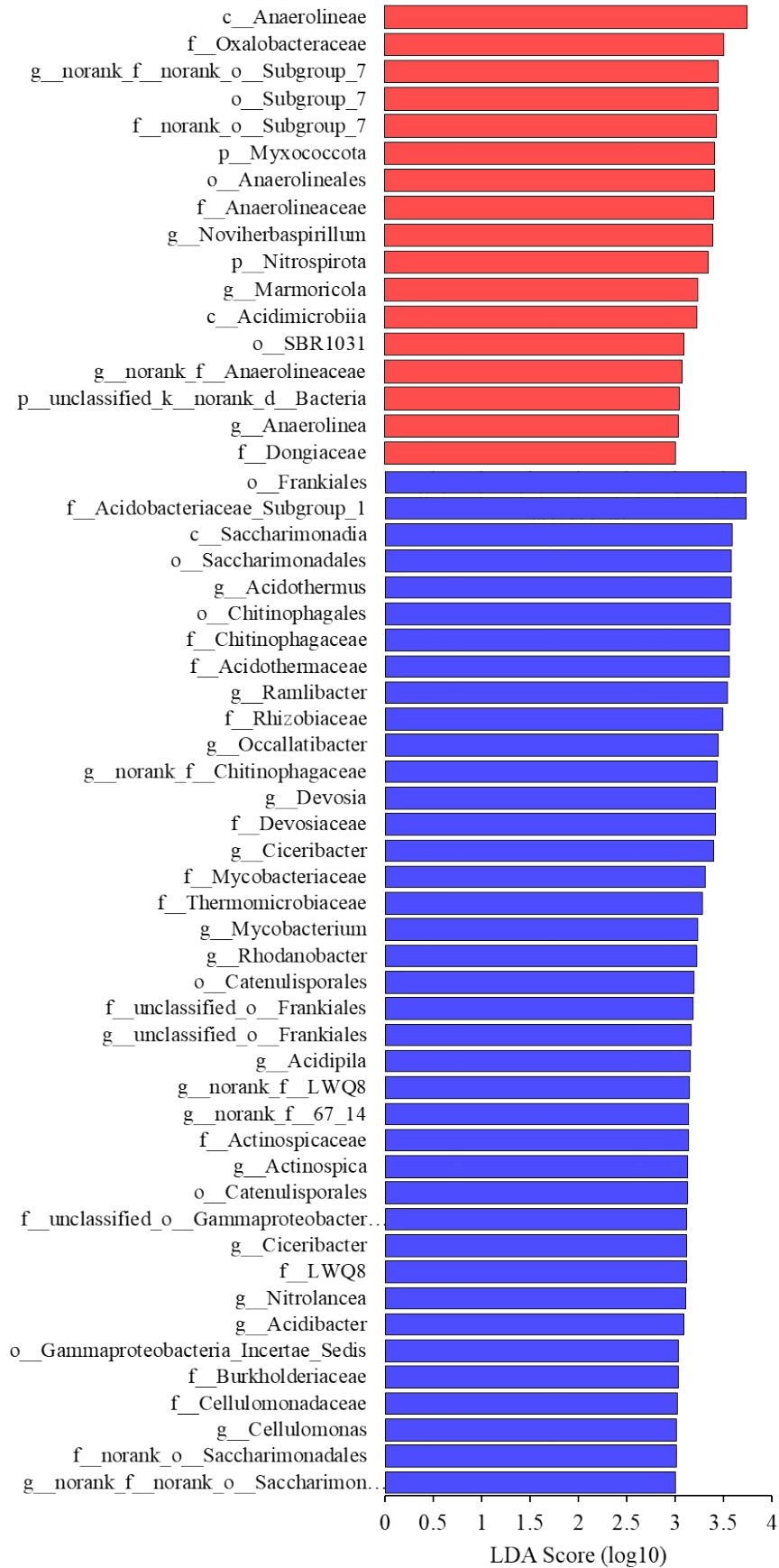


Figure S2. (A) LEfSe analysis at multiple taxonomic levels indicates the taxonomic groups with significant differences in abundance between control and 1 mg/kg AgNPs. Each ring of cladogram represents a taxonomic level, with phylum, class, order, family and genus emanating from inside to the outside. (B) LDA score shows taxa enriched in control (red) and 1mg/kg AgNPs (blue) with LDA score >3 and significance of $p < 0.05$ determined by Wilcoxon signed-rank test.