

Supplementary Information for:

# Leaching of Sulfadiazine and Florfenicol in an Entisol of a Chicken-Raising Orchard: Impact of Manure-Derived Dissolved Organic Matter

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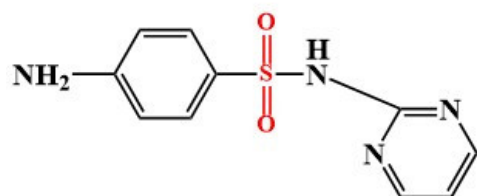
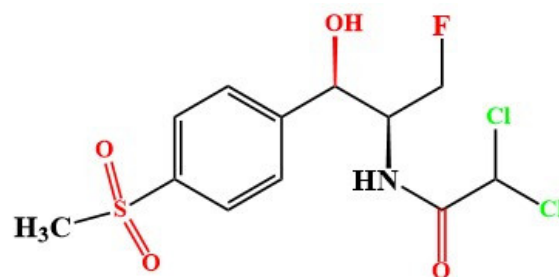
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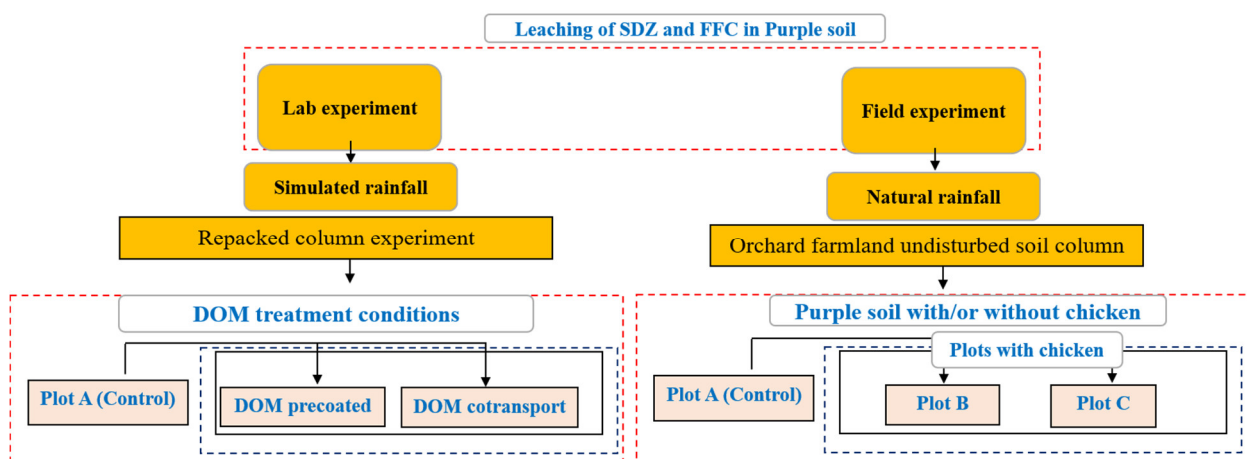
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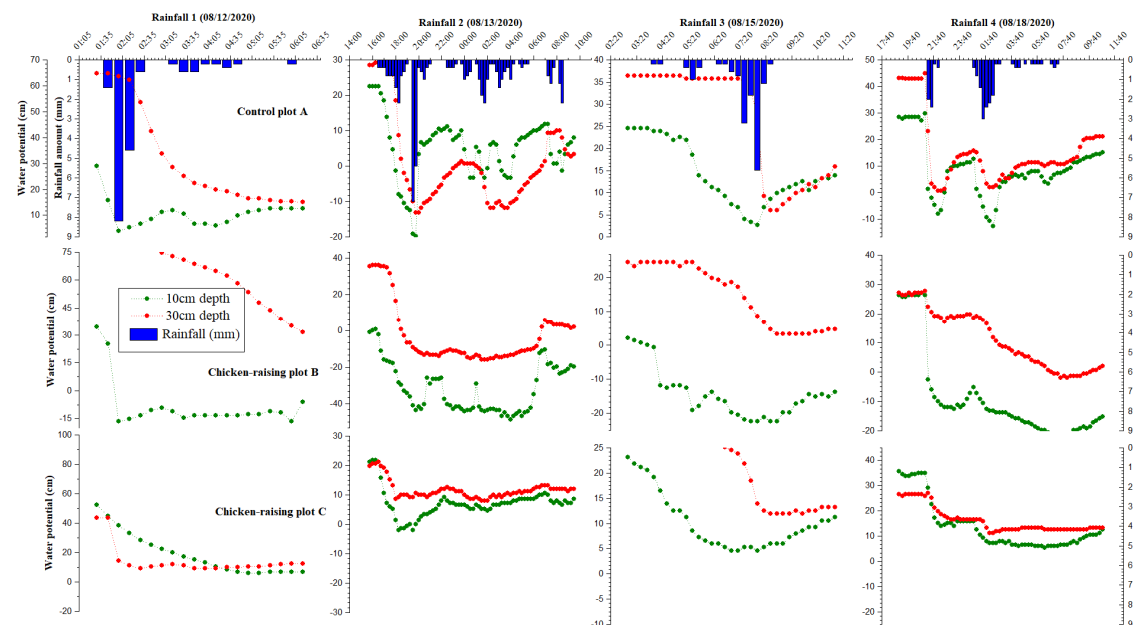
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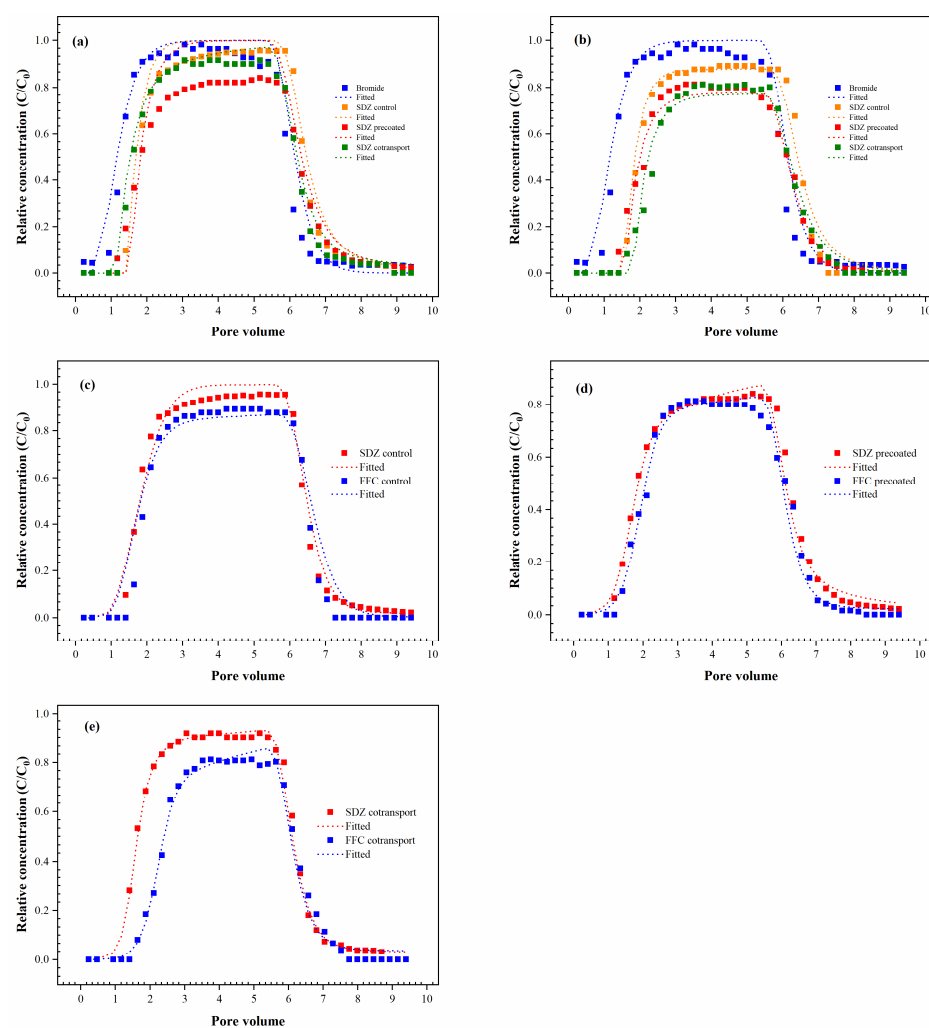
**Sulfadiazine****Florfenicol****Figure S1.** Chemical structure of sulfadiazine (SDZ) and florfenicol (FFC).



**Figure S2.** Experimental design of the antibiotic leaching experiment in the undisturbed field lysimeter and laboratory-repacked soil columns.



**Figure S3.** Temporal water potential at 10 cm and 30 cm depth continuously measured in the open-orchard field (without lysimeter) during the four rainfall events (I-IV) observed. Control plot A is plot without chicken-manure, plots B and C are manured plots (with free-ranging chickens). Redline with red-symbol represents water potential trend at 10 cm depth while greenline with green-symbol depicts water potential trend at 30 cm depth.



**Figure S4.** Breakthrough curves of Br compared with SDZ (a) and FFC (b) under DOM under various DOM treatment conditions fitted with two-site non-equilibrium adsorption model (TSM), and pairwise comparison of SDZ and FFC BTCs under control (c), DOM precoated (d), and cotransport (e) conditions fitted with two kinetic sites (TKS) model. Symbols and lines represent measurement and model fitting, respectively.

**Table S1.** Mean values of antibiotics, selected physiochemical properties, EEM PARAFAC components and DOC optical indices of lysimeter leachates under natural rainfall events (rainfall event 1–4).

Rainfall events	Plots	FFC (mg/L)	SDZ (mg/L)	DOC (mg/L)	pH (-)	EC (µS/cm)	Colloid (mg/L)	PSD (<10 µm)	C1 Fmax	C2 Fmax	C3 Fmax	SUVA <sub>254</sub>	HIX	SR
1	A	0.05 (±0.01)	0.32 (±0.03)	59.86 (±0.11)	8.13 (±0.12)	578.00 (±2.10)	0.09 (±0.0)	17.34 (±1.10)	4.24 (±0.10)	1.13 (±0.22)	1.14 (±0.0)	0.50 (±0.0)	0.90 (±0.0)	0.69 (±0.0)
	B	1.41 (±0.01)	1.23 (±0.02)	16.47 (±1.20)	7.57 (±0.30)	537.00 (±4.10)	0.83 (±0.0)	44.38 (±2.11)	2.94 (±0.0)	2.13 (±0.01)	6.48 (±0.20)	2.05 (±0.0)	0.66 (±0.0)	1.35 (±0.0)
	C	0.01 (±0.0)	0.09 (±0.0)	34.55 (±2.02)	7.40 (±0.02)	366.00 (±1.01)	1.14 (±0.01)	1.91 (±0.0)	1.85 (±0.0)	1.29 (±0.01)	5.23 (±0.10)	0.72 (±0.02)	0.60 (±0.0)	1.48 (±0.0)
2	A	0.35 (±0.0)	4.41 (±0.03)	16.47 (±2.03)	8.21 (±0.21)	557.00 (±4.08)	0.05 (±0.0)	8.99 (±1.06)	4.55 (±0.0)	1.90 (±0.0)	2.68 (±0.0)	2.19 (±0.0)	0.85 (±0.0)	0.77 (±0.0)
	B	0.24 (±0.0)	4.91 (±0.22)	10.08 (±1.33)	7.69 (±0.87)	1726.00 (±4.06)	0.81 (±0.0)	61.42 (±0.08)	3.68 (±0.0)	3.17 (±0.0)	5.48 (±0.02)	3.52 (±0.0)	0.76 (±0.0)	1.11 (±0.0)
	C	0.04 (±0.0)	5.12 (±0.42)	12.84 (±0.72)	8.85 (±0.31)	461.00 (±3.11)	0.31 (±0.0)	33.17 (±0.0)	1.88 (±0.0)	3.34 (±0.0)	2.45 (±0.0)	1.31 (±0.0)	0.80 (±0.0)	1.55 (±0.0)
3	A	0.04 (±0.0)	21.00 (±3.11)	12.61 (±0.34)	7.99 (±0.11)	487.00 (±2.43)	0.01 (±0.0)	1.40 (±0.0)	4.25 (±0.0)	1.25 (±0.0)	0.68 (±0.0)	2.45 (±0.0)	0.92 (±0.0)	0.60 (±0.0)
	B	0.18 (±0.0)	9.75 (±1.20)	8.93 (±0.84)	7.23 (±0.65)	1228.00 (±6.42)	0.63 (±0.0)	24.22 (±3.10)	3.50 (±0.0)	1.75 (±0.0)	0.93 (±0.0)	3.38 (±0.0)	0.90 (±0.0)	0.44 (±0.0)
	C	0.01 (±0.0)	4.46 (±0.0)	6.13 (±0.20)	8.85 (±0.66)	461.00 (±4.22)	0.96 (±0.55)	6.14 (±0.22)	2.00 (±0.0)	8.05 (±0.0)	2.48 (±0.0)	3.09 (±0.0)	0.85 (±0.0)	2.19 (±0.0)
4	A	0.01 (±0.0)	0.57 (±0.0)	5.02 (±0.0)	8.14 (±0.0)	596.00 (±2.82)	0.02 (±0.0)	1.82 (±0.0)	1.28 (±0.0)	0.41 (±0.0)	1.31 (±0.01)	2.26 (±0.03)	0.76 (±0.0)	1.26 (±0.01)
	B	0.10 (±0.0)	1.10 (±0.0)	10.65 (±0.44)	7.42 (±0.85)	1817.00 (±7.42)	0.20 (±0.0)	0.00 (±0.0)	4.34 (±0.0)	1.81 (±0.0)	2.22 (±0.0)	3.65 (±0.0)	0.85 (±0.0)	0.48 (±0.0)
	C	0.02 (±0.0)	1.15 (±0.0)	4.12 (±0.32)	7.89 (±0.71)	513.00 (±3.65)	1.26 (±0.0)	58.19 (±0.87)	1.65 (±0.0)	1.34 (±0.0)	0.63 (±0.0)	3.14 (±0.0)	0.89 (±0.0)	0.71 (±0.0)

Plot A represents control plot (without manure), B and C are manured plots, FFC and SDZ represent florfenicol and sulfadiazine; respectively, C1, C2, and C3 are PARAFAC components, HIX: Humification index, SR: Slope Ratio, SUVA<sub>254</sub>: Specific UV-visible absorbance, PSD<10 µm sum of particle size distribution <10 µm.

**Table S2.** Fitting parameters of two-sites chemical nonequilibrium model coupled with Freundlich isotherm.

Antibiotics	Column	$f$	$k_f$	$n$	$\alpha$ (min <sup>-1</sup> )	R <sup>2</sup>	RMSE	EM%
SDZ	Control	0.35 (±0.07)	0.63 (±0.05)	0.99 (±0.15)	6.05E-04 (±0.00)	0.988	0.05272	95.70
SDZ	Precoated	0.09 (±4.7E-03)	2.93 (±0.14)	1.35 (±0.12)	2.80E-04 (±7.62E-06)	0.995	1.46E-02	84.07
SDZ	Co-transport	0.13 (±5.6E-03)	8.29 c)	11.1 (±0.30)	2.82E-04 (±5.4E-05)	0.995	1.31E-02	91.64
FFC	Control	0.06 (±2.9E-03)	9.74 (±0.66)	2.93 (±7.20E-02)	9.17E-05 (±3.54E-04)	0.979	6.97E-02	89.21
FFC	Precoated	0.10 (±0.05)	13.04 (±1.30)	8.44 (±0.49)	3.03E-04 (±1.24E-04)	0.983	2.38E-02	81.32
FFC	Co-transport	0.22 (±0.01)	33.19 (±1.94)	30.97 (±1.94)	4.45E-04 (±3.24E-05)	0.978	5.26E-02	81.13

$f$ : fraction of adsorption sites available for instantaneous sorption,  $\alpha$ : first-order coefficient rate for two sites non-equilibrium adsorption.  $k_f$ : Freundlich coefficient,  $n$ : Freundlich exponent,  $\alpha$ , kinetic sorption rate;  $\lambda$ : dispersivity. EM: Eluted mass (calculated). R<sup>2</sup>: coefficient of determination. RMSE: root means square error. 95% confidence intervals are given in brackets. 95% confidence intervals are given in brackets.