Supporting information for:

Soil Hydraulic Properties Control Nitrate Leaching Under Continuous Rice Cultivation: Insights from Local Hydro-Pedotransfer Modeling and HYDRUS-1D

Journal: Environments

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Table S1. Geometry and initial conditions used in HYDRUS-1D.

Parameter	Unit	Soil profile			
		1	2	3	4
Length Units	cm	-	-	-	-
Number of soil materials	-	5	5	3	7
Number of Layers for Mass Balances	-	1	1	1	1
Decline from Vertical Axes	-	1	1	1	1
Depth of the Soil profile	cm	120	90	55	150
Number of nodes	-	101	101	101	101
Z	cm	1.2	0.9	0.55	1.5
Initial pressure head	cm	z - 120	z - 90	z - 55	z - 150

Table S2. Hydraulic parameters by material; van Genuchten–Mualem used in HYDRUS-1D.

Mat	θr [-]	θs [-]	α [1/cm]	n [-]	Ks [cm/d]	l [-]	Bulk.D. [g/cm³]	Disp. [cm]	Frac [-]	ThIm [-]
Soil profile 1										
1	0.0476	0.3781	0.0084	1.5627	1.2100	0.5000	1.3900	5.00	1.00	0.00
2	0.0678	0.4063	0.0063	1.6061	3.1400	0.5000	1.4100	5.00	1.00	0.00
3	0.0556	0.3646	0.0099	1.4905	4.3500	0.5000	1.5500	5.00	1.00	0.00
4	0.0639	0.3627	0.0123	1.3853	7.9800	0.5000	1.6400	5.00	1.00	0.00
5	0.0697	0.3779	0.0083	1.4855	12.7100	0.5000	1.6000	5.00	1.00	0.00
Soil profile 2										
1	0.0544	0.3516	0.0098	1.4731	6.2000	0.5000	1.6100	5.00	1.00	0.00
2	0.0510	0.3392	0.0265	1.2553	1.4200	0.5000	1.7200	5.00	1.00	0.00
3	0.0578	0.3804	0.0228	1.3535	5.5100	0.5000	1.5700	5.00	1.00	0.00
4	0.0529	0.3420	0.0277	1.2422	7.2000	0.5000	1.7200	5.00	1.00	0.00
5	0.0439	0.3354	0.0360	1.2996	9.0400	0.5000	1.7100	5.00	1.00	0.00
Soil profile 3										
1	0.0968	0.4804	0.0116	1.3947	1.1500	0.5000	1.4000	5.00	1.00	0.00
2	0.0966	0.4713	0.0121	1.3732	3.0300	0.5000	1.4400	5.00	1.00	0.00
3	0.0945	0.4508	0.0124	1.3517	5.3400	0.5000	1.5100	5.00	1.00	0.00
Soil profile 4										
1	0.0501	0.3266	0.0220	1.2604	3.4500	0.5000	1.7600	5.00	1.00	0.00
2	0.0750	0.3736	0.0204	1.2225	1.1500	0.5000	1.6800	5.00	1.00	0.00
3	0.0747	0.3461	0.0273	1.1531	2.4700	0.5000	1.8100	5.00	1.00	0.00
4	0.0831	0.3846	0.0275	1.1675	5.4800	0.5000	1.6700	5.00	1.00	0.00
5	0.0908	0.4473	0.0166	1.3189	9.8800	0.5000	1.4400	5.00	1.00	0.00
6	0.0879	0.4487	0.0198	1.3033	13.0600	0.5000	1.4200	5.00	1.00	0.00
7	0.0735	0.4024	0.0209	1.2840	16.1800	0.5000	1.5500	5.00	1.00	0.00

Table S3. Solute transport parameters associated with the soil materials used in HYDRUS-1D.

Parameter	Value	Unit / Condition	Observation
Soil profile 1			
Disp.	5	cm	Same value for all materials
Frac	1	[-]	Same value for all materials
ThIm	0	[-]	Same value for all materials
Diffus. W.	1.64	according to HYDRUS internal units	Diffusion in water
Diffus. G.	0	according to HYDRUS internal units	Gas diffusion = 0
Soil profile 2			
Disp.	5	cm	Same value for all materials
Frac	1	[-]	Same value for all materials
ThIm	0	[-]	Same value for all materials
Diffus. W.	1.64	according to HYDRUS internal units	Diffusion in water
Diffus. G.	0	according to HYDRUS internal units	Gas diffusion = 0
Soil profile 3			
Disp.	5	cm	Same value for all materials
Frac	1	[-]	Same value for all materials
ThIm	0	[-]	Same value for all materials
Diffus. W.	1.64	according to HYDRUS internal units	Diffusion in water
Diffus. G.	0	according to HYDRUS internal units	Gas diffusion = 0
Soil profile 4			
Disp.	5	cm	Same value for all materials
Frac	1	[-]	Same value for all materials
ThIm	0	[-]	Same value for all materials

Diffus. W.	1.64	according to HYDRUS internal units	Diffusion in water
Diffus. G.	0	according to HYDRUS internal units	Gas diffusion = 0

Table S4. Initial pressure profile (101 nodes) used in HYDRUS-1D.

Node	z [cm]	h [cm]	Root [1/cm]	Axz	Bxz	Dxz	Mat	Lay	T(c°)	Conc
Soil profile 1										
1	0.00	-120.00	0	1	1	1	1	1	20	0.05699
2	1.20	-118.80	0	1	1	1	1	1	20	0.05699
3	2.40	-117.60	0	1	1	1	1	1	20	0.05699
4	3.60	-116.40	0	1	1	1	1	1	20	0.05699
5	4.80	-115.20	0	1	1	1	1	1	20	0.05699
6	6.00	-114.00	0	1	1	1	1	1	20	0.05699
7	7.20	-112.80	0	1	1	1	1	1	20	0.05699
8	8.40	-111.60	0	1	1	1	1	1	20	0.05699
9	9.60	-110.40	0	1	1	1	1	1	20	0.05699
10	10.80	-109.20	0	1	1	1	1	1	20	0.05699
11	12.00	-108.00	0	1	1	1	1	1	20	0.05699
12	13.20	-106.80	0	1	1	1	1	1	20	0.05699
13	14.40	-105.60	0	1	1	1	1	1	20	0.05699
14	15.60	-104.40	0	1	1	1	1	1	20	0.05699
15	16.80	-103.20	0	1	1	1	1	1	20	0.0834
16	18.00	-102.00	0	1	1	1	1	1	20	0.0834
17	19.20	-100.80	0	1	1	1	1	1	20	0.0834
18	20.40	-99.60	0	1	1	1	1	1	20	0.0834
19	21.60	-98.40	0	1	1	1	1	1	20	0.0834
20	22.80	-97.20	0	1	1	1	1	1	20	0.0834
21	24.00	-96.00	0	1	1	1	1	1	20	0.0834
22	25.20	-94.80	0	1	1	1	1	1	20	0.0834

23	26.40	-93.60	0	1	1	1	1	1	20	0.0834
24	27.60	-92.40	0	1	1	1	1	1	20	0.0834
25	28.80	-91.20	0	1	1	1	1	1	20	0.0834
26	30.00	-90.00	0	1	1	1	1	1	20	0.139
27	31.20	-88.80	0	1	1	1	1	1	20	0.139
28	32.40	-87.60	0	1	1	1	1	1	20	0.139
29	33.60	-86.40	0	1	1	1	1	1	20	0.139
30	34.80	-85.20	0	1	1	1	1	1	20	0.139
31	36.00	-84.00	0	1	1	1	1	1	20	0.139
32	37.20	-82.80	0	1	1	1	1	1	20	0.139
33	38.40	-81.60	0	1	1	1	1	1	20	0.139
34	39.60	-80.40	0	1	1	1	1	1	20	0.139
35	40.80	-79.20	0	1	1	1	1	1	20	0.139
36	42.00	-78.00	0	1	1	1	1	1	20	0.139
37	43.20	-76.80	0	1	1	1	1	1	20	0.139
38	44.40	-75.60	0	1	1	1	1	1	20	0.139
39	45.60	-74.40	0	1	1	1	1	1	20	0.139
40	46.80	-73.20	0	1	1	1	1	1	20	0.139
41	48.00	-72.00	0	1	1	1	1	1	20	0.139
42	49.20	-70.80	0	1	1	1	1	1	20	0.139
43	50.40	-69.60	0	1	1	1	1	1	20	0.139
44	51.60	-68.40	0	1	1	1	1	1	20	0.139
45	52.80	-67.20	0	1	1	1	1	1	20	0.139
46	54.00	-66.00	0	1	1	1	1	1	20	0.10703
47	55.20	-64.80	0	1	1	1	1	1	20	0.10703
48	56.40	-63.60	0	1	1	1	1	1	20	0.10703

49	57.60	-62.40	0	1	1	1	1	1	20	0.10703
50	58.80	-61.20	0	1	1	1	1	1	20	0.10703
51	60.00	-60.00	0	1	1	1	1	1	20	0.10703
52	61.20	-58.80	0	1	1	1	1	1	20	0.10703
53	62.40	-57.60	0	1	1	1	1	1	20	0.10703
54	63.60	-56.40	0	1	1	1	1	1	20	0.10703
55	64.80	-55.20	0	1	1	1	1	1	20	0.10703
56	66.00	-54.00	0	1	1	1	1	1	20	0.10703
57	67.20	-52.80	0	1	1	1	1	1	20	0.10703
58	68.40	-51.60	0	1	1	1	1	1	20	0.10703
59	69.60	-50.40	0	1	1	1	1	1	20	0.10703
60	70.80	-49.20	0	1	1	1	1	1	20	0.10703
61	72.00	-48.00	0	1	1	1	1	1	20	0.10703
62	73.20	-46.80	0	1	1	1	1	1	20	0.10703
63	74.40	-45.60	0	1	1	1	1	1	20	0.10703
64	75.60	-44.40	0	1	1	1	1	1	20	0.10703
65	76.80	-43.20	0	1	1	1	1	1	20	0.10703
66	78.00	-42.00	0	1	1	1	1	1	20	0.10703
67	79.20	-40.80	0	1	1	1	1	1	20	0.10703
68	80.40	-39.60	0	1	1	1	1	1	20	0.10703
69	81.60	-38.40	0	1	1	1	1	1	20	0.10703
70	82.80	-37.20	0	1	1	1	1	1	20	0.10703
71	84.00	-36.00	0	1	1	1	1	1	20	0.10703
72	85.20	-34.80	0	1	1	1	1	1	20	0.10703
73	86.40	-33.60	0	1	1	1	1	1	20	0.10703
74	87.60	-32.40	0	1	1	1	1	1	20	0.10703

75	88.80	-31.20	0	1	1	1	1	1	20	0.10703
76	90.00	-30.00	0	1	1	1	1	1	20	0.10703
77	91.20	-28.80	0	1	1	1	1	1	20	0.10703
78	92.40	-27.60	0	1	1	1	1	1	20	0.10703
79	93.60	-26.40	0	1	1	1	1	1	20	0.09869
80	94.80	-25.20	0	1	1	1	1	1	20	0.09869
81	96.00	-24.00	0	1	1	1	1	1	20	0.09869
82	97.20	-22.80	0	1	1	1	1	1	20	0.09869
83	98.40	-21.60	0	1	1	1	1	1	20	0.09869
84	99.60	-20.40	0	1	1	1	1	1	20	0.09869
85	100.80	-19.20	0	1	1	1	1	1	20	0.09869
86	102.00	-18.00	0	1	1	1	1	1	20	0.09869
87	103.20	-16.80	0	1	1	1	1	1	20	0.09869
88	104.40	-15.60	0	1	1	1	1	1	20	0.09869
89	105.60	-14.40	0	1	1	1	1	1	20	0.09869
90	106.80	-13.20	0	1	1	1	1	1	20	0.09869
91	108.00	-12.00	0	1	1	1	1	1	20	0.09869
92	109.20	-10.80	0	1	1	1	1	1	20	0.09869
93	110.40	-9.60	0	1	1	1	1	1	20	0.09869
94	111.60	-8.40	0	1	1	1	1	1	20	0.09869
95	112.80	-7.20	0	1	1	1	1	1	20	0.09869
96	114.00	-6.00	0	1	1	1	1	1	20	0.09869
97	115.20	-4.80	0	1	1	1	1	1	20	0.09869
98	116.40	-3.60	0	1	1	1	1	1	20	0.09869
99	117.60	-2.40	0	1	1	1	1	1	20	0.09869
100	118.80	-1.20	0	1	1	1	1	1	20	0.09869

Soil profile 2										
1	0.00	-90.00	0	1	1	1	1	1	20	0.03197
2	0.90	-89.10	0	1	1	1	1	1	20	0.03197
3	1.80	-88.20	0	1	1	1	1	1	20	0.03197
4	2.70	-87.30	0	1	1	1	1	1	20	0.03197
5	3.60	-86.40	0	1	1	1	1	1	20	0.03197
6	4.50	-85.50	0	1	1	1	1	1	20	0.03197
7	5.40	-84.60	0	1	1	1	1	1	20	0.03197
8	6.30	-83.70	0	1	1	1	1	1	20	0.03197
9	7.20	-82.80	0	1	1	1	1	1	20	0.03197
10	8.10	-81.90	0	1	1	1	1	1	20	0.03197
11	9.00	-81.00	0	1	1	1	1	1	20	0.03197
12	9.90	-80.10	0	1	1	1	1	1	20	0.03197
13	10.80	-79.20	0	1	1	1	1	1	20	0.03197
14	11.70	-78.30	0	1	1	1	1	1	20	0.03197
15	12.60	-77.40	0	1	1	1	1	1	20	0.03197
16	13.50	-76.50	0	1	1	1	1	1	20	0.03197
17	14.40	-75.60	0	1	1	1	1	1	20	0.03197
18	15.30	-74.70	0	1	1	1	1	1	20	0.03197
19	16.20	-73.80	0	1	1	1	1	1	20	0.03197
20	17.10	-72.90	0	1	1	1	1	1	20	0.03197
21	18.00	-72.00	0	1	1	1	1	1	20	0.03197
22	18.90	-71.10	0	1	1	1	1	1	20	0.03197
23	19.80	-70.20	0	1	1	1	1	1	20	0.04031
24	20.70	-69.30	0	1	1	1	1	1	20	0.04031
25	21.60	-68.40	0	1	1	1	1	1	20	0.04031

26	22.50	-67.50	0	1	1	1	1	1	20	0.04031
27	23.40	-66.60	0	1	1	1	1	1	20	0.04031
28	24.30	-65.70	0	1	1	1	1	1	20	0.04031
29	25.20	-64.80	0	1	1	1	1	1	20	0.04031
30	26.10	-63.90	0	1	1	1	1	1	20	0.04031
31	27.00	-63.00	0	1	1	1	1	1	20	0.04031
32	27.90	-62.10	0	1	1	1	1	1	20	0.04031
33	28.80	-61.20	0	1	1	1	1	1	20	0.04031
34	29.70	-60.30	0	1	1	1	1	1	20	0.04031
35	30.60	-59.40	0	1	1	1	1	1	20	0.04031
36	31.50	-58.50	0	1	1	1	1	1	20	0.04031
37	32.40	-57.60	0	1	1	1	1	1	20	0.04031
38	33.30	-56.70	0	1	1	1	1	1	20	0.04031
39	34.20	-55.80	0	1	1	1	1	1	20	0.04031
40	35.10	-54.90	0	1	1	1	1	1	20	0.04031
41	36.00	-54.00	0	1	1	1	1	1	20	0.04031
42	36.90	-53.10	0	1	1	1	1	1	20	0.04031
43	37.80	-52.20	0	1	1	1	1	1	20	0.04031
44	38.70	-51.30	0	1	1	1	1	1	20	0.04031
45	39.60	-50.40	0	1	1	1	1	1	20	0.04031
46	40.50	-49.50	0	1	1	1	1	1	20	0.04031
47	41.40	-48.60	0	1	1	1	1	1	20	0.04031
48	42.30	-47.70	0	1	1	1	1	1	20	0.02919
49	43.20	-46.80	0	1	1	1	1	1	20	0.02919
50	44.10	-45.90	0	1	1	1	1	1	20	0.02919
51	45.00	-45.00	0	1	1	1	1	1	20	0.02919

52	45.90	-44.10	0	1	1	1	1	1	20	0.02919
53	46.80	-43.20	0	1	1	1	1	1	20	0.02919
54	47.70	-42.30	0	1	1	1	1	1	20	0.02919
55	48.60	-41.40	0	1	1	1	1	1	20	0.02919
56	49.50	-40.50	0	1	1	1	1	1	20	0.02919
57	50.40	-39.60	0	1	1	1	1	1	20	0.02919
58	51.30	-38.70	0	1	1	1	1	1	20	0.02919
59	52.20	-37.80	0	1	1	1	1	1	20	0.02919
60	53.10	-36.90	0	1	1	1	1	1	20	0.02919
61	54.00	-36.00	0	1	1	1	1	1	20	0.02919
62	54.90	-35.10	0	1	1	1	1	1	20	0.02919
63	55.80	-34.20	0	1	1	1	1	1	20	0.02919
64	56.70	-33.30	0	1	1	1	1	1	20	0.02919
65	57.60	-32.40	0	1	1	1	1	1	20	0.02919
66	58.50	-31.50	0	1	1	1	1	1	20	0.02919
67	59.40	-30.60	0	1	1	1	1	1	20	0.02919
68	60.30	-29.70	0	1	1	1	1	1	20	0.02919
69	61.20	-28.80	0	1	1	1	1	1	20	0.02919
70	62.10	-27.90	0	1	1	1	1	1	20	0.02919
71	63.00	-27.00	0	1	1	1	1	1	20	0.02919
72	63.90	-26.10	0	1	1	1	1	1	20	0.03614
73	64.80	-25.20	0	1	1	1	1	1	20	0.03614
74	65.70	-24.30	0	1	1	1	1	1	20	0.03614
75	66.60	-23.40	0	1	1	1	1	1	20	0.03614
76	67.50	-22.50	0	1	1	1	1	1	20	0.03614
77	68.40	-21.60	0	1	1	1	1	1	20	0.03614

78	69.30	-20.70	0	1	1	1	1	1	20	0.03614
79	70.20	-19.80	0	1	1	1	1	1	20	0.03614
80	71.10	-18.90	0	1	1	1	1	1	20	0.03614
81	72.00	-18.00	0	1	1	1	1	1	20	0.03614
82	72.90	-17.10	0	1	1	1	1	1	20	0.03614
83	73.80	-16.20	0	1	1	1	1	1	20	0.03614
84	74.70	-15.30	0	1	1	1	1	1	20	0.03614
85	75.60	-14.40	0	1	1	1	1	1	20	0.03614
86	76.50	-13.50	0	1	1	1	1	1	20	0.03614
87	77.40	-12.60	0	1	1	1	1	1	20	0.03614
88	78.30	-11.70	0	1	1	1	1	1	20	0.03614
89	79.20	-10.80	0	1	1	1	1	1	20	0.03614
90	80.10	-9.90	0	1	1	1	1	1	20	0.03614
91	81.00	-9.00	0	1	1	1	1	1	20	0.03614
92	81.90	-8.10	0	1	1	1	1	1	20	0.03614
93	82.80	-7.20	0	1	1	1	1	1	20	0.03614
94	83.70	-6.30	0	1	1	1	1	1	20	0.02919
95	84.60	-5.40	0	1	1	1	1	1	20	0.02919
96	85.50	-4.50	0	1	1	1	1	1	20	0.02919
97	86.40	-3.60	0	1	1	1	1	1	20	0.02919
98	87.30	-2.70	0	1	1	1	1	1	20	0.02919
99	88.20	-1.80	0	1	1	1	1	1	20	0.02919
100	89.10	-0.90	0	1	1	1	1	1	20	0.02919
101	90.00	0.00	0	1	1	1	1	1	20	0.02919
Soil profile 3										
1	0.00	-55.00	0	1	1	1	1	1	20	0.06811

2	0.55	-54.45	0	1	1	1	1	1	20	0.06811
3	1.10	-53.90	0	1	1	1	1	1	20	0.06811
4	1.65	-53.35	0	1	1	1	1	1	20	0.06811
5	2.20	-52.80	0	1	1	1	1	1	20	0.06811
6	2.75	-52.25	0	1	1	1	1	1	20	0.06811
7	3.30	-51.70	0	1	1	1	1	1	20	0.06811
8	3.85	-51.15	0	1	1	1	1	1	20	0.06811
9	4.40	-50.60	0	1	1	1	1	1	20	0.06811
10	4.95	-50.05	0	1	1	1	1	1	20	0.06811
11	5.50	-49.50	0	1	1	1	1	1	20	0.06811
12	6.05	-48.95	0	1	1	1	1	1	20	0.06811
13	6.60	-48.40	0	1	1	1	1	1	20	0.06811
14	7.15	-47.85	0	1	1	1	1	1	20	0.06811
15	7.70	-47.30	0	1	1	1	1	1	20	0.06811
16	8.25	-46.75	0	1	1	1	1	1	20	0.06811
17	8.80	-46.20	0	1	1	1	1	1	20	0.06811
18	9.35	-45.65	0	1	1	1	1	1	20	0.06811
19	9.90	-45.10	0	1	1	1	1	1	20	0.06811
20	10.45	-44.55	0	1	1	1	1	1	20	0.06811
21	11.00	-44.00	0	1	1	1	1	1	20	0.06811
22	11.55	-43.45	0	1	1	1	1	1	20	0.06811
23	12.10	-42.90	0	1	1	1	1	1	20	0.06811
24	12.65	-42.35	0	1	1	1	1	1	20	0.06811
25	13.20	-41.80	0	1	1	1	1	1	20	0.06811
26	13.75	-41.25	0	1	1	1	1	1	20	0.06811
27	14.30	-40.70	0	1	1	1	1	1	20	0.06811

28	14.85	-40.15	0	1	1	1	1	1	20	0.06811
29	15.40	-39.60	0	1	1	1	1	1	20	0.06811
30	15.95	-39.05	0	1	1	1	1	1	20	0.06811
31	16.50	-38.50	0	1	1	1	1	1	20	0.06811
32	17.05	-37.95	0	1	1	1	1	1	20	0.06811
33	17.60	-37.40	0	1	1	1	1	1	20	0.06811
34	18.15	-36.85	0	1	1	1	1	1	20	0.06811
35	18.70	-36.30	0	1	1	1	1	1	20	0.01668
36	19.25	-35.75	0	1	1	1	1	1	20	0.01668
37	19.80	-35.20	0	1	1	1	1	1	20	0.01668
38	20.35	-34.65	0	1	1	1	1	1	20	0.01668
39	20.90	-34.10	0	1	1	1	1	1	20	0.01668
40	21.45	-33.55	0	1	1	1	1	1	20	0.01668
41	22.00	-33.00	0	1	1	1	1	1	20	0.01668
42	22.55	-32.45	0	1	1	1	1	1	20	0.01668
43	23.10	-31.90	0	1	1	1	1	1	20	0.01668
44	23.65	-31.35	0	1	1	1	1	1	20	0.01668
45	24.20	-30.80	0	1	1	1	1	1	20	0.01668
46	24.75	-30.25	0	1	1	1	1	1	20	0.01668
47	25.30	-29.70	0	1	1	1	1	1	20	0.01668
48	25.85	-29.15	0	1	1	1	1	1	20	0.01668
49	26.40	-28.60	0	1	1	1	1	1	20	0.01668
50	26.95	-28.05	0	1	1	1	1	1	20	0.01668
51	27.50	-27.50	0	1	1	1	1	1	20	0.01668
52	28.05	-26.95	0	1	1	1	1	1	20	0.01668
53	28.60	-26.40	0	1	1	1	1	1	20	0.01668

54	29.15	-25.85	0	1	1	1	1	1	20	0.01668
55	29.70	-25.30	0	1	1	1	1	1	20	0.01668
56	30.25	-24.75	0	1	1	1	1	1	20	0.01668
57	30.80	-24.20	0	1	1	1	1	1	20	0.01668
58	31.35	-23.65	0	1	1	1	1	1	20	0.01668
59	31.90	-23.10	0	1	1	1	1	1	20	0.01668
60	32.45	-22.55	0	1	1	1	1	1	20	0.01668
61	33.00	-22.00	0	1	1	1	1	1	20	0.01668
62	33.55	-21.45	0	1	1	1	1	1	20	0.01668
63	34.10	-20.90	0	1	1	1	1	1	20	0.01668
64	34.65	-20.35	0	1	1	1	1	1	20	0.01668
65	35.20	-19.80	0	1	1	1	1	1	20	0.01668
66	35.75	-19.25	0	1	1	1	1	1	20	0.01668
67	36.30	-18.70	0	1	1	1	1	1	20	0.01668
68	36.85	-18.15	0	1	1	1	1	1	20	0.01668
69	37.40	-17.60	0	1	1	1	1	1	20	0.01668
70	37.95	-17.05	0	1	1	1	1	1	20	0.01668
71	38.50	-16.50	0	1	1	1	1	1	20	0.01668
72	39.05	-15.95	0	1	1	1	1	1	20	0.01668
73	39.60	-15.40	0	1	1	1	1	1	20	0.01668
74	40.15	-14.85	0	1	1	1	1	1	20	0.01668
75	40.70	-14.30	0	1	1	1	1	1	20	0.0139
76	41.25	-13.75	0	1	1	1	1	1	20	0.0139
77	41.80	-13.20	0	1	1	1	1	1	20	0.0139
78	42.35	-12.65	0	1	1	1	1	1	20	0.0139
79	42.90	-12.10	0	1	1	1	1	1	20	0.0139

80	43.45	-11.55	0	1	1	1	1	1	20	0.0139
81	44.00	-11.00	0	1	1	1	1	1	20	0.0139
82	44.55	-10.45	0	1	1	1	1	1	20	0.0139
83	45.10	-9.90	0	1	1	1	1	1	20	0.0139
84	45.65	-9.35	0	1	1	1	1	1	20	0.0139
85	46.20	-8.80	0	1	1	1	1	1	20	0.0139
86	46.75	-8.25	0	1	1	1	1	1	20	0.0139
87	47.30	-7.70	0	1	1	1	1	1	20	0.0139
88	47.85	-7.15	0	1	1	1	1	1	20	0.0139
89	48.40	-6.60	0	1	1	1	1	1	20	0.0139
90	48.95	-6.05	0	1	1	1	1	1	20	0.0139
91	49.50	-5.50	0	1	1	1	1	1	20	0.0139
92	50.05	-4.95	0	1	1	1	1	1	20	0.0139
93	50.60	-4.40	0	1	1	1	1	1	20	0.0139
94	51.15	-3.85	0	1	1	1	1	1	20	0.0139
95	51.70	-3.30	0	1	1	1	1	1	20	0.0139
96	52.25	-2.75	0	1	1	1	1	1	20	0.0139
97	52.80	-2.20	0	1	1	1	1	1	20	0.0139
98	53.35	-1.65	0	1	1	1	1	1	20	0.0139
99	53.90	-1.10	0	1	1	1	1	1	20	0.0139
100	54.45	-0.55	0	1	1	1	1	1	20	0.0139
101	55.00	0.00	0	1	1	1	1	1	20	0.0139
Soil profile 4										
1	0.00	-150.00	0	1	1	1	1	1	20	0.11676
2	1.50	-148.50	0	1	1	1	1	1	20	0.11676
3	3.00	-147.00	0	1	1	1	1	1	20	0.11676

4	4.50	-145.50	0	1	1	1	1	1	20	0.11676
5	6.00	-144.00	0	1	1	1	1	1	20	0.11676
6	7.50	-142.50	0	1	1	1	1	1	20	0.11676
7	9.00	-141.00	0	1	1	1	1	1	20	0.11676
8	10.50	-139.50	0	1	1	1	1	1	20	0.11676
9	12.00	-138.00	0	1	1	1	1	1	20	0.11676
10	13.50	-136.50	0	1	1	1	1	1	20	0.11676
11	15.00	-135.00	0	1	1	1	1	1	20	0.11676
12	16.50	-133.50	0	1	1	1	1	1	20	0.11676
13	18.00	-132.00	0	1	1	1	1	1	20	0.11676
14	19.50	-130.50	0	1	1	1	1	1	20	0.2224
15	21.00	-129.00	0	1	1	1	1	1	20	0.2224
16	22.50	-127.50	0	1	1	1	1	1	20	0.2224
17	24.00	-126.00	0	1	1	1	1	1	20	0.2224
18	25.50	-124.50	0	1	1	1	1	1	20	0.2224
19	27.00	-123.00	0	1	1	1	1	1	20	0.2224
20	28.50	-121.50	0	1	1	1	1	1	20	0.2224
21	30.00	-120.00	0	1	1	1	1	1	20	0.2224
22	31.50	-118.50	0	1	1	1	1	1	20	0.2224
23	33.00	-117.00	0	1	1	1	1	1	20	0.2224
24	34.50	-115.50	0	1	1	1	1	1	20	0.2224
25	36.00	-114.00	0	1	1	1	1	1	20	0.2919
26	37.50	-112.50	0	1	1	1	1	1	20	0.2919
27	39.00	-111.00	0	1	1	1	1	1	20	0.2919
28	40.50	-109.50	0	1	1	1	1	1	20	0.2919
29	42.00	-108.00	0	1	1	1	1	1	20	0.2919

30	43.50	-106.50	0	1	1	1	1	1	20	0.2919
31	45.00	-105.00	0	1	1	1	1	1	20	0.2919
32	46.50	-103.50	0	1	1	1	1	1	20	0.2919
33	48.00	-102.00	0	1	1	1	1	1	20	0.2919
34	49.50	-100.50	0	1	1	1	1	1	20	0.2919
35	51.00	-99.00	0	1	1	1	1	1	20	0.2641
36	52.50	-97.50	0	1	1	1	1	1	20	0.2641
37	54.00	-96.00	0	1	1	1	1	1	20	0.2641
38	55.50	-94.50	0	1	1	1	1	1	20	0.2641
39	57.00	-93.00	0	1	1	1	1	1	20	0.2641
40	58.50	-91.50	0	1	1	1	1	1	20	0.2641
41	60.00	-90.00	0	1	1	1	1	1	20	0.2641
42	61.50	-88.50	0	1	1	1	1	1	20	0.2641
43	63.00	-87.00	0	1	1	1	1	1	20	0.2641
44	64.50	-85.50	0	1	1	1	1	1	20	0.2641
45	66.00	-84.00	0	1	1	1	1	1	20	0.2641
46	67.50	-82.50	0	1	1	1	1	1	20	0.10425
47	69.00	-81.00	0	1	1	1	1	1	20	0.10425
48	70.50	-79.50	0	1	1	1	1	1	20	0.10425
49	72.00	-78.00	0	1	1	1	1	1	20	0.10425
50	73.50	-76.50	0	1	1	1	1	1	20	0.10425
51	75.00	-75.00	0	1	1	1	1	1	20	0.10425
52	76.50	-73.50	0	1	1	1	1	1	20	0.10425
53	78.00	-72.00	0	1	1	1	1	1	20	0.10425
54	79.50	-70.50	0	1	1	1	1	1	20	0.10425
55	81.00	-69.00	0	1	1	1	1	1	20	0.10425

56	82.50	-67.50	0	1	1	1	1	1	20	0.10425
57	84.00	-66.00	0	1	1	1	1	1	20	0.10425
58	85.50	-64.50	0	1	1	1	1	1	20	0.10425
59	87.00	-63.00	0	1	1	1	1	1	20	0.10703
60	88.50	-61.50	0	1	1	1	1	1	20	0.10703
61	90.00	-60.00	0	1	1	1	1	1	20	0.10703
62	91.50	-58.50	0	1	1	1	1	1	20	0.10703
63	93.00	-57.00	0	1	1	1	1	1	20	0.10703
64	94.50	-55.50	0	1	1	1	1	1	20	0.10703
65	96.00	-54.00	0	1	1	1	1	1	20	0.10703
66	97.50	-52.50	0	1	1	1	1	1	20	0.10703
67	99.00	-51.00	0	1	1	1	1	1	20	0.10703
68	100.50	-49.50	0	1	1	1	1	1	20	0.10703
69	102.00	-48.00	0	1	1	1	1	1	20	0.10703
70	103.50	-46.50	0	1	1	1	1	1	20	0.10703
71	105.00	-45.00	0	1	1	1	1	1	20	0.10703
72	106.50	-43.50	0	1	1	1	1	1	20	0.10703
73	108.00	-42.00	0	1	1	1	1	1	20	0.10703
74	109.50	-40.50	0	1	1	1	1	1	20	0.10703
75	111.00	-39.00	0	1	1	1	1	1	20	0.06116
76	112.50	-37.50	0	1	1	1	1	1	20	0.06116
77	114.00	-36.00	0	1	1	1	1	1	20	0.06116
78	115.50	-34.50	0	1	1	1	1	1	20	0.06116
79	117.00	-33.00	0	1	1	1	1	1	20	0.06116
80	118.50	-31.50	0	1	1	1	1	1	20	0.06116
81	120.00	-30.00	0	1	1	1	1	1	20	0.06116

82	121.50	-28.50	0	1	1	1	1	1	20	0.06116
83	123.00	-27.00	0	1	1	1	1	1	20	0.06116
84	124.50	-25.50	0	1	1	1	1	1	20	0.06116
85	126.00	-24.00	0	1	1	1	1	1	20	0.06116
86	127.50	-22.50	0	1	1	1	1	1	20	0.06116
87	129.00	-21.00	0	1	1	1	1	1	20	0.06116
88	130.50	-19.50	0	1	1	1	1	1	20	0.06116
89	132.00	-18.00	0	1	1	1	1	1	20	0.06116
90	133.50	-16.50	0	1	1	1	1	1	20	0.06116
91	135.00	-15.00	0	1	1	1	1	1	20	0.06116
92	136.50	-13.50	0	1	1	1	1	1	20	0.06116
93	138.00	-12.00	0	1	1	1	1	1	20	0.06116
94	139.50	-10.50	0	1	1	1	1	1	20	0.06116
95	141.00	-9.00	0	1	1	1	1	1	20	0.06116
96	142.50	-7.50	0	1	1	1	1	1	20	0.06116
97	144.00	-6.00	0	1	1	1	1	1	20	0.06116
98	145.50	-4.50	0	1	1	1	1	1	20	0.06116
99	147.00	-3.00	0	1	1	1	1	1	20	0.06116
100	148.50	-1.50	0	1	1	1	1	1	20	0.06116
101	150.00	0.00	0	1	1	1	1	1	20	0.06116

Table S5. Common settings applied identically to all four test pits.

Module	Parameter	Configuration	Unit / Register	Notes
Processes	Water Flow	Activated	-	Main process
Processes	Vapor Flow	Deactivated	-	
Processes	Solute Transport	Activated → Standard Solute Transport	-	Soluto 1 = NO_3^-
Processes	Major Ion Chemistry / HP1 (PHREEQC)	Deactivated	-	
Processes	Heat Transport	Deactivated	-	
Processes	Root Water Uptake	Activated	-	Modelo Feddes
Processes	Root Growth	Deactivated	-	
Processes	Inverse Solution	Deactivated	-	
Geometry	Length Units	cm	-	Common to all 4 test pits
Geometry	Layers for Mass Balances	1	-	
Geometry	Decline from Vertical Axis	1	[-]	1 = vertical
Time	Time Units	Days	-	
Time	Initial Time / Final Time	0 / 3650	day	10 years
Time	Initial Time Step	0.01	day	
Time	Minimum Time Step	1E-5	day	
Time	Maximum Time Step	1	day	
Time	Time-Variable Boundary Conditions	Activated	3650 records	1 daily record
Time	Repeat same set of BC records	Deactivated	-	
Time	Daily variations in transpiration	Deactivated	-	
Time	Sinusoidal variations in precipitation	Deactivated	-	
Meteorology	Meteorological Data	Activated	3650 records	Daily series
Meteorology	ET method	Hargreaves Formula	-	
Meteorology	Daily variations in meteo data during day	Deactivated	-	

Output/Print	T-Level Information	Deactivated	-	
Output/Print	Print at Regular Time Interval	Activated	every 10 days	
Output/Print	Screen Output	Activated	-	
Output/Print	Print Fluxes for Observation Nodes	Activated	-	Instead of Temp.
Output/Print	Hit Enter at End	Deactivated	-	
Output/Print	Number of Print Times	10	-	Individual times do not appear in the screenshot
Numerical Criteria	Maximum Number of Iterations	10	-	
Numerical Criteria	Water Content Tolerance	0.001	[-]	
Numerical Criteria	Pressure Head Tolerance	1	cm	
Numerical Criteria	Lower/Upper Optimal Iteration Range	3 / 7	-	
Numerical Criteria	Lower/Upper Time Step Multiplication Factor	1.3 / 0.7	-	
Numerical Criteria	Lower/Upper Tension Interval	1E-6 / 10000	cm	
Hydraulic Model	Single Porosity Model	van Genuchten–Mualem	-	
Hydraulic Model	Air-Entry Value of -2 cm	Deactivated	-	
Hydraulic Model	Dual-porosity / Dual-permeability / Lookup Tables	Deactivated	-	
Hydraulic Model	Hysteresis	No hysteresis	-	
Water BC	Upper Boundary Condition	Atmospheric BC with Surface Layer	-	
Water BC	Triggered Irrigation	Deactivated	-	
Water BC	Lower Boundary Condition	Variable Pressure Head	-	
Water BC	Initial Condition	In Pressure Heads	-	
Water BC	Max h at Soil Surface	5	cm	
Solute Transport	Time Weighting Scheme	Implicit Scheme	-	
Solute Transport	Space Weighting Scheme	Upstream Weighting FE	-	

Solute Transport	Mass Units	mg	-	
Solute Transport	Stability Criterion	2	-	
Solute Transport	Temperature Dependence	Deactivated	-	
Solute Transport	Water Content Dependence	Activated	-	
Solute Transport	Nonequilibrium model	Equilibrium Model	-	
Solute Transport	Tortuosity Factor	Activated → Millington & Quirk	-	
Solute Transport	Number of Solutes	1	-	
Solute Transport	Pulse Duration	1	day	
Solute Transport	Absolute/Relative Concentration Tolerance	0.0001 / 0.0001	-	
Solute Transport	Maximum Number of Iterations	30	-	
Solute Reaction	Kd	0 in all materials	-	
Solute Reaction	Nu	0 in all materials	-	
Solute Reaction	Beta	1 in all materials	-	
Solute Reaction	Henry	0 in all materials	-	
Solute Reaction	SinkWater1	0 in all materials	-	
Solute BC	Upper Boundary Condition	Concentration Flux BC	-	
Solute BC	Lower Boundary Condition	Zero Concentration Gradient	-	
Solute BC	Initial Conditions	In Total Concentrations	Mass solute / Volume soil	The screenshot shows the option, not the initial values
Roots	Water Uptake Reduction Model	Feddes	-	
Roots	Solute Stress Model	No Solute Stress	-	
Roots	Critical Stress Index for Water Uptake	1	-	
Roots	cRoot (passive root solute uptake)	1	-	
Roots	Active Solute Uptake	Deactivated	-	
Feddes	P0 / POpt / P2H / P2L / P3	100 / 55 / -160 / -250 / -15000	cm	
Feddes	r2H / r2L	0.5 / 0.1	cm/día	
Daily BC Series	Columns entered	Time, Precip.,	3650 filas	

		hCritA, GWL, cTop, cBot		
Daily BC Series	hCritA	15000	cm	Value shown in the final configuration
Daily BC Series	GWL	0	cm	Value shown in the table
Daily BC Series	Precip.	Daily variable	cm/día	Example day 1 = 1.252
Daily BC Series	cTop / cBot	Daily variables / cBot = 0	-	cTop = 0 outside fertilization days; cTop = 3.18348 mg/cm³ on days 25 and 35 of each campaign. 2 campaigns were simulated per year, equivalent to 4 pulses per year and 40 pulses in 10 years. cBot = 0.
Meteorological Series	Columnas	Time, T_max, T_min	3650 filas	Same series for all 4 test pits
Meteorological Series	Chequeo día 1	Tmax 26.75 / Tmin 19.45	°C	Value visible in the screenshot

Table S6. Soil profile data.

Name	Horizon	top	bottom	Color	Mottles	Nitrates	pH	Bulk Density	LEP2	CE	hue	value	chroma	m_hue	m_value	m_chroma	m_pct	Clay	CEC	Ca2+	Mg2+	K+	Na+	Al^{+3} + H^{+}	Arcilla muy fina	M.o
P1	A	0	18	7.5YR 3/1	5% 10YR 3/4	41	5.17	1.39										12.39%	14.67	10.72	0.53	0.11	0.05	0.10		3.887238265
P1	AB	18	31	7.5YR 3/1	10% 10YR 3/4	60	5.5	1.41	0.07	0.151	2.5YR	3	1	10YR	3	4	10	21.67%	16.91	14.32	0.56	0.08	0.01	0.05		4.364618403
P1	Bg1	31	55	7.5YR 3/1	40% 10YR 3/4	100	6.2	1.55	0.07	0.345	2.5YR	3	1	10YR	3	4	40	18.76%	18.94	17.32	0.58	0.09	0.02	0.00		3.341660965
P1	Bg2	55	95	7.5YR 3/2	5% 10YR 4/4	77	6.22	1.64	0.08	0.243	2.5YR	3	2	10YR	4	4	5	26.15%	14.46	13.07	0.71	0.06	0.03	0.00		3.000675152

P1	Bg3	95	120	7.5YR 3/3	5% 10YR 4/4	71	6.25	1.60	0.07	0.107	2.5YR	3	3	10YR	4	4	5	26.69%	13.44	12.29	0.61	0.06	0.01	0.00		1.6367 31901
	w																									
P2	Ap	0	19	10YR 3/2	1% 7.5YR 7/8	23	4.23	1.61	0.06	0.116	10YR	3	2	7.5YR	7	8	1	18.93%	**11.20**	**3.49**	**0.44**	**0.12**	**0.01**	**0.70**		2.6596 89339
P2	Bg1	19	42	10YR 4/2	5% 7.5YR 7/8	29	4.23	1.72	0.05	0.071	10YR	4	2	7.5YR	7	8	5	21.67%	9.17	2.11	0.23	0.09	0.01	1.45		0.6819 716254
P2	Bg2	42	63	10YR 4/1	40% 7.5YR 7/8	21	4.41	1.57	0.04	0.059	10YR	4	1	7.5YR	7	8	40	21.00%	9.78	2.31	0.20	0.04	0.01	1.10		0.8183 659505

P2	Bg3	63	83	10YR 4/2	15% 7.5YR 7/6	26	4.35	1.72	0.04	0.107	10YR	4	2	7.5YR	7	6	15	23.00%	11.00	2.55	0.23	0.04	0.01	1.45		0.9547602756
P2	C	83	90	10YR 4/3	5% 7.5YR 7/6	21	4.47	1.71	0.05	0.065	10YR	4	3	7.5YR	7	6	5	15.21%	7.54	3.09	0.28	0.09	0.01	0.90		0.9547602756
P3	Ap	0	18	7.5YR 3/2	5% 7.5YR 6/8	84	3.86	1.76	0.05	0.102	7.5YR	3	2	7.5YR	6	8	5	22.21%	**10.80**	**2.37**	**0.39**	**0.06**	**0.03**	**0.70**		1.9777 17714
P3	Bg1	18	35	7.5YR 3/2	10% 7.5YR 6/8	160	3.93	1.68	0.04	0.066	7.5YR	3	2	7.5YR	6	8	10	39.48%	7.54	2.57	0.35	0.04	0.02	1.55		1.5685 34738

P3	Bg2	35	50	7.5YR 4/1	30% 7.5YR 6/8	210	3.75	1.81	0.1	0.096	7.5YR	4	1	7.5YR	6	8	30	45.56%	11.20	2.51	0.41	0.05	0.01	3.20		1.2275 48926
P3	Bg3	50	66	7.5YR 4/1	30% 5YR 5/3	190	3.96	1.67	0.1	0.025	7.5YR	4	1	5YR	5	3	30	40.21%	12.02	3.20	0.43	0.16	0.03	1.95		3.2052 6664
P3	Bg4	66	86	Gley 2 8/5PB	80% 7.5YR 6/8	75	3.94	1.44	0.08	0.065	7.5YR	6	8	Gley 2	8	5PB	80	43.91%	12.22	3.59	0.54	0.12	0.03	2.90		0.2727 886502
P3	Bg5	86	110	GLEY 2 7/5PB	80% 2.5Y 6/8	77	3.75	1.42	0.08	0.057	2.5YR	6	8	Gley 2	7	5PB	80	43.37%	8.56	2.94	0.56	0.09	0.14	4.20		0.2045 914876

P3	Bg6	110	150	Gley 2 7/5PB	80% 2.5Y 6/8	44	3.79	1.55	0.1	0.027	2.5Y	6	8	2Gley2	7	5PB	80	24.00%	14.26	2.87	0.63	0.07	0.08	4.05		0.4773801378
P4	Ap	0	18	5YR 3/3		49	7.28	1.40	0.10	0.55	5YR	3	3	5YR	3	3	3	34.01%	**24.24**	**22.09**	**1.81**	**0.31**	**0.03**	**0.00**		2.796083664
P4	Bg1	18	40	5YR 4/3	3% 5YR 6/3	12	7.21	1.49	0.10	0.43	5YR	4	3	5YR	3	4	3	51.35%	28.93	26.90	1.70	0.29	0.03	0.00		2.455097852
P4	Bg2	40	55	5YR 3/4	3% 5YR 6/4	10	7.00	1.51	0.07	0.47	5YR	3	4					51.51%	26.68	24.08	2.22	0.27	0.12	0.00		1.636731901

	w																								