Supplement of

Modification of the RothC model to simulate soil C mineralization of exogenous organic matter

Claudio Mondini et al.,

Correspondence to: Claudio Mondini (claudio.mondini@crea.gov.it)

Table S1. Incubation conditions, exogenous organic matter (EOM) pool parameters from model optimization, statistical indicators of model goodness of fit and cumulative net respiration for compost amended soils.

EOM	Phase	Days	Soil	Temp °C	WHC	EOM rate %	C rate µg g^{-1}	f_{DEOM}	f_{REOM}	f_{HEOM}	K_{DEOM}	K_{REOM}	SSR µg C g^{-1}	RMSE %	R	E %	M µg C g^{-1}	CO_2-C %
VSC	MC	30	SM	20	40	0.5	1725	0.02	0.39	0.59	45	0.35	42	1.3	0.9994	0.33	0.11	3.0
VSC	MC	30	PE	20	40	0.5	1725	0.02	0.44	0.54	58	0.25	193	2.9	0.9972	-0.03	-0.01	2.8
VSC	MC	32	LL	20	40	0.5	1725	0.00	0.44	0.56	150	0.15	137	9.5	0.9756	0.25	0.02	0.9
VSC	MC	29	AL	20	40	0.5	1725	0.01	0.30	0.69	224	0.18	25	3.5	0.9957	-0.05	-0.01	1.0
HWC	MC	30	SM	20	40	0.5	1720	0.02	0.37	0.61	43	0.35	40	1.3	0.9995	0.31	0.11	3.0
HWC	MC	32	SM	20	40	0.5	1720	0.02	0.33	0.65	43	0.15	36	1.6	0.9990	0.19	0.06	2.6
HWC	MC	32	SM	20	40	0.5	1720	0.02	0.34	0.63	41	0.15	87	2.6	0.9976	0.27	0.09	2.5
HWC	MC	35	SM	30	40	0.5	1720	0.02	0.30	0.68	74	0.15	179	3.2	0.9930	0.15	0.06	2.6
HWC	MC	35	SM	30	40	0.5	1720	0.01	0.35	0.64	93	0.15	334	5.6	0.9825	0.19	0.06	2.1
HWC	MC	36	SM	10	40	0.5	1720	0.02	0.34	0.64	44	0.15	20	2.1	0.9995	1.53	0.28	1.6
HWC	MC	36	SM	10	40	0.5	1720	0.02	0.37	0.60	35	0.15	10	1.4	0.9996	0.22	0.04	1.8
HWC	MC	28	SM	20	20	0.5	1720	0.01	0.31	0.68	118	0.29	65	3.8	0.9932	-0.41	-0.09	1.6
HWC	MC	28	SM	20	30	0.5	1720	0.01	0.53	0.46	127	0.19	35	3.0	0.9958	0.74	0.14	1.5
HWC	MC	34	SM	20	40	0.1	344	0.02	0.28	0.70	54	0.86	6	2.3	0.9987	0.39	0.04	4.3
HWC	MC	34	SM	20	40	0.25	860	0.02	0.28	0.70	54	0.39	17	2.4	0.9984	0.42	0.07	2.6
HWC	MC	30	PE	20	40	0.5	1720	0.02	0.30	0.68	69	0.40	293	3.6	0.9952	-1.46	-0.50	2.8
HWC	MC	32	LL	20	40	0.5	1720	0.01	0.29	0.70	222	0.16	13	1.7	0.9979	0.16	0.02	1.4
HWC	MC	30	AL	20	40	0.5	1720	0.01	0.26	0.72	72	0.46	46	2.5	0.9981	0.64	0.14	2.0
GWB	MC	13	PE	20	40	0.75	2115	0.01	0.52	0.47	200	0.42	21	2.7	0.9978	0.72	0.13	1.3
GWB	MC	13	GO	20	40	0.75	2115	0.01	0.40	0.59	200	0.15	10	1.9	0.9983	0.28	0.05	1.0
CMC	II	37	JU	20	40	0.5	2135	0.04	0.89	0.07	38	0.31	115	0.8	0.9998	-0.02	-0.02	6.1
CMC	III	37	JU	20	40	0.5	2063	0.05	0.63	0.32	28	0.33	173	1.0	0.9997	-0.10	-0.08	6.0
CMC	MC	37	JU	20	40	0.5	1993	0.002	0.31	0.69	105	0.36	48	3.1	0.9983	0.41	0.06	1.4
CBC	II	37	JU	20	40	0.5	2174	0.07	0.74	0.19	22	0.23	94	0.7	0.9999	-0.03	-0.03	6.6
CBC	III	37	JU	20	40	0.5	2124	0.07	0.59	0.34	18	0.16	651	2.1	0.9989	-0.35	-0.27	5.6
CBC	IV	37	JU	20	40	0.5	2117	0.05	0.57	0.38	16	0.23	3981	6.5	0.9952	-0.98	-0.62	4.9
CBC	MC	37	JU	20	40	0.5	2031	0.01	0.35	0.64	99	0.38	113	3.1	0.9979	-0.68	-0.15	1.9
CMC	II	37	JU	30	40	0.5	2135	0.06	0.84	0.10	45	0.37	494	1.0	0.9996	0.02	0.03	9.6
CMC	III	37	JU	30	40	0.5	2063	0.06	0.62	0.32	30	0.38	590	1.3	0.9994	0.00	0.00	8.5
CMC	MC	37	JU	30	40	0.5	1993	0.01	0.21	0.78	62	0.57	181	2.9	0.9982	0.21	0.07	2.7
CBC	II	37	JU	30	40	0.5	2174	0.09	0.71	0.20	21	0.33	1897	1.7	0.9990	0.18	0.30	11.1
CBC	III	37	JU	30	40	0.5	2124	0.07	0.65	0.28	21	0.37	953	1.6	0.9997	-0.02	-0.03	9.3
CBC	IV	37	JU	30	40	0.5	2117	0.05	0.55	0.40	17	0.21	2512	3.8	0.9967	0.28	0.24	6.2
CBC	MC	37	JU	30	40	0.5	2031	0.01	0.26	0.73	190	0.52	283	3.2	0.9975	0.08	0.03	3.0
mean								0.03	0.44	0.53	79	0.30	403	2.7	0.9968	0.11	0.01	3.7
minimum								0.00	0.21	0.07	16	0.15	6	0.7	0.9756	-1.46	-0.62	0.9
maximum								0.09	0.89	0.78	224	0.86	3981	9.5	0.9999	1.53	0.30	11.1

EOM: exogenous organic matter; WHC: water holding capacity; DEOM: decomposable EOM; REOM: resistant EOM; HEOM: humified EOM; f: partitioning coefficient; K: decomposition constant rate (y^{-1}); SSR: sum of squared residuals; RMSE: root mean square error; R: coefficient of correlation; E: relative error; M: mean difference; CO_2-C: cumulative net CO_2-C emission in amended soil; MC: mature compost; roman numerals refer to phases of the composting process. For EOM code refer to Table 3, for soil code refer to Table 2.

Table S2. Incubation conditions, exogenous organic matter (EOM) pool parameters from model optimization, statistical indicators of model goodness of fit and cumulative net respiration for bioenergy by-products**.**

EOM	Days	Soil	Temp °C	WHC	EOM rate %	C rate µg g^{-1}	f_{DEOM}	f_{REOM}	K_{DEOM}	K_{REOM}	SSR µg C g^{-1}	RMSE %	R	E %	M µg C g^{-1}	CO_2-C %
BR	30	SM	20	40	0.5	2425	0.12	0.88	147	0.68	30347	4.3	0.990	-1.47	-4.27	15.1
BR	30	PE	20	40	0.5	2425	0.15	0.85	145	0.37	8416	2.2	0.995	0.17	0.50	14.3
BR	34	SM	20	40	0.1	485	0.12	0.88	115	0.52	252	2.5	0.996	0.30	0.17	14.5
BR	34	SM	20	40	0.1	485	0.11	0.89	124	0.52	233	2.6	0.995	0.29	0.16	13.7
BR	32	LL	20	40	0.5	2425	0.11	0.89	113	0.29	1835	1.3	0.998	-0.01	-0.02	10.9
BR	29	AL	20	40	0.5	2425	0.20	0.80	81	0.15	152617	9.5	0.985	-0.42	-1.39	16.8
RSM	36	SM	10	40	0.5	2295	0.04	0.96	136	1.20	5211	5.0	0.993	-0.43	-0.54	8.2
RSM	36	SM	10	40	0.5	2295	0.04	0.96	186	1.36	6075	5.3	0.991	-0.26	-0.33	8.5
RSM	30	SM	20	40	0.5	2295	0.11	0.89	44	0.32	3128	2.0	0.998	-0.04	-0.09	11.8
RSM	32	SM	20	40	0.5	2295	0.15	0.85	65	0.33	3102	1.9	0.998	0.07	0.20	14.7
RSM	32	SM	20	40	0.5	2295	0.16	0.84	71	0.32	2583	1.5	0.999	0.14	0.42	16.0
RSM	35	SM	30	40	0.5	2295	0.13	0.87	108	0.18	3467	1.9	0.996	0.00	-0.01	13.5
RSM	35	SM	30	40	0.5	2295	0.14	0.86	125	0.17	5010	2.2	0.994	0.21	0.61	14.0
RSM	28	SM	20	20	0.5	2295	0.17	0.83	72	0.24	1060	1.2	0.999	-0.04	-0.12	15.1
RSM	28	SM	20	30	0.5	2295	0.15	0.85	70	0.33	822	1.1	0.999	-0.04	-0.10	14.3
RSM	30	PE	20	40	0.5	2295	0.12	0.88	90	0.32	3373	1.9	0.998	-0.14	-0.32	12.0
RSM	34	SM	20	40	0.25	1148	0.13	0.87	69	0.37	239	1.1	0.999	0.00	0.00	14.4
RSM	34	SM	20	40	0.1	459	0.13	0.87	75	0.41	78	1.6	0.999	-0.08	-0.04	14.1
RSM	32	LL	20	40	0.5	2295	0.07	0.93	49	0.15	810	1.6	0.999	-0.16	-0.19	6.9
RSM	29	AL	20	40	0.5	2295	0.11	0.89	77	0.15	92204	11.5	0.989	-6.44	-13.70	9.6
mean							0.12	0.88	98	0.42	16043	3.1	0.996	-0.42	-0.95	12.9
minimum							0.04	0.80	44	0.15	78	1.1	0.985	-6.44	-13.70	6.9
maximum							0.20	0.96	186	1.36	152617	11.5	0.999	0.30	0.61	16.8

EOM: exogenous organic matter; WHC: water holding capacity; DEOM: decomposable EOM; REOM: resistant EOM; HEOM: humified EOM; f: partitioning factor; K: decomposition constant rate (y^{-1}); SSR: sum of squared residuals; RMSE: root mean square error; R: coefficient of correlation; E: relative error; M: mean difference; CO_2-C: cumulative net CO_2-C emission in amended soil.

For EOM code refer to Table 3, for soil code refer to Table 2.

Table S3. Incubation conditions, EOM pool parameters from model optimization, statistical indicators of model goodness of fit and cumulative net respiration for anaerobic digestates.

EOM	Days	Soil	Temp °C	WHC	EOM rate %	C rate µg g^{-1}	f_{DEOM}	f_{REOM}	f_{HEOM}	K_{DEOM}	K_{REOM}	SSR µg C g^{-1}	RMSE %	R	E %	M µg C g^{-1}	CO_2-C %
PS	36	SM	10	40	0.50	1895	0.02	0.84	0.15	40	0.86	621	5.0	0.9961	-0.58	-0.2	3.9
PS	36	SM	10	40	0.50	1895	0.00	0.70	0.30	187	1.52	727	5.4	0.9953	0.14	0.1	4.1
PS	30	SM	20	40	0.50	1895	0.08	0.62	0.30	26	0.15	345	1.5	0.9995	-0.25	-0.2	7.1
PS	32	SM	20	40	0.50	1895	0.06	0.64	0.30	38	0.21	122	1.1	0.9996	0.11	0.1	6.5
PS	32	SM	20	40	0.50	1895	0.07	0.63	0.30	52	0.21	305	1.6	0.9989	-0.40	-0.4	6.8
PS	35	SM	30	40	0.50	1895	0.05	0.65	0.30	73	0.15	1328	3.6	0.9892	-0.35	-0.3	5.8
PS	35	SM	30	40	0.50	1895	0.04	0.66	0.30	84	0.15	701	2.8	0.9951	1.47	1.2	5.4
PS	28	SM	20	20	0.50	1895	0.04	0.81	0.14	72	0.32	235	2.2	0.9986	-0.32	-0.2	5.1
PS	28	SM	20	30	0.50	1895	0.04	0.66	0.30	69	0.37	126	1.6	0.9991	-0.19	-0.1	5.0
PS	30	PE	20	40	0.50	1895	0.04	0.90	0.06	70	0.28	98	1.0	0.9996	0.05	0.0	5.3
PS	34	SM	20	40	0.10	379	0.05	0.75	0.20	55	0.43	13	1.7	0.9990	0.25	0.0	7.2
PS	34	SM	20	40	0.25	948	0.05	0.65	0.30	57	0.44	45	1.4	0.9993	0.16	0.1	6.7
PS	32	LL	20	40	0.50	1895	0.03	0.67	0.30	41	0.15	111	1.5	0.9991	-0.02	0.0	3.4
PS	29	AL	20	40	0.50	1895	0.05	0.73	0.22	47	0.16	303	2.2	0.9987	-0.12	-0.1	4.9
OW1	21	SM	20	40	0.75	325	0.00	0.70	0.30	270	0.15	7	18.8	0.9446	2.67	0.0	0.8
OW1	26	SM	20	40	1.50	649	0.01	0.83	0.16	64	0.17	5	3.0	0.9989	0.58	0.0	2.0
OW1	10	CO	20	40	1.50	649	0.01	0.78	0.21	260	0.15	9	4.81	0.9919	3.39	0.1	1.6
OW2	13	SM	20	40	0.75	347	0.01	0.83	0.16	151	0.20	2	5.1	0.9943	0.95	0.0	3.3
OW2	23	SM	20	40	1.50	693	0.02	0.79	0.19	151	0.44	1	1.6	0.9995	-0.20	0.0	3.9
OW2	7	CO	20	40	1.50	693	0.01	0.69	0.30	267	0.17	6	3.9	0.9967	0.93	0.1	1.6
OW3	26	SM	20	40	0.75	362	0.00	0.70	0.30	280	0.15	51	37.2	0.7938	1.08	0.0	0.9
OW3	22	SM	20	40	1.50	723	0.01	0.69	0.30	72	0.15	39	9.2	0.9878	-1.60	-0.1	1.8
OW3	7	CO	20	40	1.50	723	0.01	0.69	0.30	279	0.15	9	5.5	0.9903	1.18	0.1	1.2
OW4	26	SM	20	40	0.75	404	0.01	0.69	0.30	280	0.15	31	13.8	0.9645	1.75	0.1	1.4
OW4	22	SM	20	40	1.50	807	0.01	0.84	0.15	230	0.39	48	7.7	0.9892	0.24	0.0	2.8
OW4	7	CO	20	40	1.50	807	0.01	0.69	0.30	330	0.15	9	3.6	0.9943	0.55	0.1	1.7
OW4	13	PE	20	40	1.50	807	0.02	0.68	0.30	229	0.19	116	7.9	0.9793	3.16	0.5	2.1
mean							0.03	0.72	0.25	140	0.30	201	5.7	0.9849	0.54	0.0	3.8
minimum							0.00	0.62	0.06	26	0.15	1	1.0	0.7938	-1.60	-0.4	0.8
maximum							0.08	0.90	0.30	330	1.52	1328	37	0.9996	3.39	1.2	7.2

EOM: exogenous organic matter; WHC: water holding capacity; DEOM: decomposable EOM; REOM: resistant EOM; HEOM: humified EOM; f: partitioning coefficient; K: decomposition constant rate (y^{-1}); SSR: sum of squared residuals; RMSE: root mean square error; R: coefficient of correlation; E: relative error; M: mean difference; CO_2-C: cumulative net CO_2-C emission in amended soil.

For EOM code refer to Table 3, for soil code refer to Table 2.

804 **Table S4a.** Incubation conditions, exogenous organic matter (EOM) pool parameters from model
805 optimization, statistical indicators of model goodness of fit and cumulative net respiration for
806 meat and bone meals.

EOM	Days	Soil	Temp °C	WHC	EOM rate µg C g^{-1}	EOM rate kg N ha^{-1}	f_{DEOM}	f_{REOM}	K_{DEOM}	K_{REOM}	SSR µg C g^{-1}	RMSE %	R	E %	M µg C g^{-1}	CO_2-C %
BV1	14	PE	20	40	961	800	0.15	0.85	89	1.15	1449	3.8	0.997	-1.05	-1.12	15.5
BV1	14	PE	25	40	961	800	0.21	0.79	90	1.41	507	1.5	0.999	-0.15	-0.23	22.1
BV1	12	BU	20	40	240	200	0.19	0.81	51	0.20	359	11.2	0.992	-6.37	-1.22	12.8
BV1	12	BU	20	40	480	400	0.17	0.83	64	0.18	1619	11.8	0.991	-6.69	-2.58	12.3
BV1	12	LO	20	40	240	200	0.31	0.69	83	0.22	359	5.1	0.997	-1.83	-0.77	24.3
BV1	12	LO	20	40	480	400	0.33	0.67	81	0.15	1377	4.7	0.996	-1.38	-1.23	25.5
BV1	13	GO	20	40	120	100	0.26	0.74	64	0.15	34	3.9	0.997	0.38	0.07	20.3
BV1	13	SM	20	40	120	100	0.27	0.73	71	0.43	102	6.0	0.996	-2.21	-0.43	23.1
BV1	13	GO	20	40	240	200	0.23	0.77	74	0.15	121	4.1	0.996	-0.67	-0.21	17.9
BV1	13	SM	20	40	240	200	0.24	0.76	65	0.35	413	7.3	0.996	-3.59	-1.15	19.8
BV1	13	GO	20	40	480	400	0.24	0.76	74	0.15	588	4.3	0.996	-0.72	-0.46	18.7
BV1	13	SM	20	40	481	400	0.24	0.76	65	0.33	1796	7.4	0.996	-3.75	-2.46	20.2
BV1	14	SM	20	40	961	800	0.16	0.84	66	0.23	6376	9.9	0.993	-6.28	-5.52	13.5
BV1	14	PE	25	40	240	200	0.18	0.82	79	0.16	36	2.3	0.998	-0.18	-0.05	15.3
BV1	14	SM	25	40	240	200	0.15	0.85	83	0.15	121	4.7	0.997	-1.90	-0.48	13.1
BV1	14	PE	25	40	481	400	0.18	0.82	77	0.49	219	2.8	0.999	-0.91	-0.53	15.9
BV1	14	SM	25	40	481	400	0.16	0.84	75	0.20	706	5.5	0.996	-2.50	-1.31	14.4
BV1	14	SM	25	40	961	800	0.22	0.78	55	0.15	2654	4.2	0.995	-0.15	-0.20	18.3
BV1	13	PE	20	40	114	100	0.14	0.86	85	1.45	6	2.2	0.999	-0.22	-0.03	15.4
BV1	13	PE	20	40	228	200	0.13	0.87	109	1.03	13	1.7	0.999	-0.005	-0.001	13.4
BV1	14	SM	20	40	114	100	0.15	0.85	82	0.45	13	3.2	0.998	-0.77	-0.09	14.3
BV1	14	SM	20	40	228	200	0.14	0.86	85	0.32	54	3.4	0.997	-0.72	-0.16	13.1
BV1	14	SM	20	40	455	400	0.14	0.86	100	0.69	440	4.4	0.997	-1.70	-0.83	14.5
BV1	14	SM	20	40	683	600	0.15	0.85	92	0.62	739	3.9	0.998	-1.56	-1.13	14.5
BV1	13	PE	20	40	455	400	0.17	0.83	88	0.89	100	2.1	0.999	-0.16	-0.08	15.9
BV1	13	PE	20	40	683	600	0.15	0.85	90	0.53	224	2.4	0.998	-0.26	-0.17	13.7

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808 EOM: exogenous organic matter; WHC: water holding capacity; DEOM: decomposable EOM; REOM: resistant
809 EOM; HEOM: humified EOM; f: partitioning coefficient; K: decomposition constant rate (y^{-1}); SSR: sum of
810 squared residuals; RMSE: root mean square error; R: coefficient of correlation; E: relative error; M: mean
811 difference; CO_2-C: cumulative net CO_2-C emission in amended soil.
812 For EOM code refer to Table 3, for soil code refer to Table 2.
813

Table S4b. Incubation conditions, exogenous organic matter (EOM) pool parameters from model optimization, statistical indicators of model goodness of fit and cumulative net respiration for meat and bone meals.

EOM	Days	Soil	Temp °C	WHC	EOM rate μg C g^{-1}	EOM rate kg N ha^{-1}	f_{DEOM}	f_{REOM}	K_{DEOM}	K_{REOM}	SSR μg C g^{-1}	RMSE %	R	E %	M μg C g^{-1}	CO_2-C %
SB	9	BU	20	40	211	200	0.63	0.37	13	0.15	150	8.9	0.994	-4.74	-0.85	16.1
SB	9	LO	20	40	211	200	0.60	0.40	52	0.32	88	2.5	0.999	-0.66	-0.33	38.6
SB	9	SM	20	40	211	200	0.45	0.55	40	0.26	189	5.3	0.998	-2.66	-0.90	27.2
SB	16	RI	15	40	211	200	0.45	0.55	42	0.41	283	4.4	0.997	-0.82	-0.31	28.7
SB	13	RI	20	40	211	200	0.37	0.63	42	0.20	409	7.7	0.997	-3.60	-1.22	25.1
SB	16	JU	15	40	211	200	0.17	0.83	56	0.15	540	16.1	0.991	-11.18	-1.63	11.6
SB	16	PE	15	40	211	200	0.15	0.85	75	0.23	127	6.8	0.995	-2.65	-0.44	11.7
SB	18	SM	15	40	211	200	0.15	0.85	83	0.26	633	13.4	0.989	-8.08	-1.46	12.5
SB	9	GO	20	40	211	200	0.36	0.64	48	0.15	214	6.3	0.994	-0.54	-0.16	22.6
SB	13	JU	20	40	211	200	0.20	0.80	58	0.18	169	8.1	0.996	-3.98	-0.82	14.5
SB	13	PE	20	40	211	200	0.24	0.76	50	0.25	52	3.8	0.999	-1.72	-0.42	17.4
SB	27	JU	20	40	2460	2220	0.19	0.81	58	0.90	6498	1.8	0.999	-0.15	-0.52	20.0
SB	27	LO	20	40	2460	2220	0.30	0.70	77	0.30	41474	2.9	0.996	-0.35	-1.84	25.9
SB	26	SM	20	40	2460	2220	0.21	0.79	27	0.36	16202	3.9	0.997	0.75	2.11	18.1
SB	26	SM	20	40	4920	4440	0.07	0.93	101	0.92	27626	3.4	0.996	0.08	0.33	12.8
SB	26	SM	20	40	9840	8880	0.10	0.90	73	0.27	44765	2.4	0.998	-0.34	-2.58	10.2
SW	10	SM	20	40	259	200	0.34	0.66	75	0.23	889	6.7	0.996	-3.97	-1.87	26.8
BV2	14	PE	25	40	903	800	0.20	0.80	131	1.62	562	1.7	0.998	-0.06	-0.09	21.7
BV2	16	PE	15	40	193	200	0.15	0.85	93	0.16	149	7.2	0.993	-2.56	-0.43	12.2
BV2	18	SM	15	40	193	200	0.16	0.84	81	0.21	211	7.5	0.994	-2.83	-0.53	13.5
BV2	16	PE	15	40	386	400	0.16	0.84	83	0.18	538	6.7	0.994	-2.11	-0.73	12.8
BV2	18	SM	15	40	386	400	0.16	0.84	69	0.15	708	7.2	0.996	-3.55	-1.26	13.3
BV2	13	PE	20	40	226	200	0.21	0.79	77	0.50	67	3.5	0.998	-1.24	-0.35	17.7
BV2	10	SM	20	40	226	200	0.16	0.84	77	0.15	86	4.8	0.995	-0.92	-0.19	12.8
BV2	13	PE	20	40	451	400	0.22	0.78	83	0.26	636	5.4	0.997	-2.52	-1.42	17.5
BV2	10	SM	20	40	451	400	0.15	0.85	94	0.17	945	8.3	0.995	-4.58	-1.81	12.5
BV2	14	PE	20	40	903	800	0.18	0.82	94	0.22	1231	3.7	0.995	-0.45	-0.46	14.8
BV2	14	SM	20	40	903	800	0.16	0.84	75	0.18	3783	7.8	0.995	-4.71	-4.04	13.4
BV2	14	PE	25	40	226	200	0.19	0.81	105	0.35	24	1.8	0.998	-0.09	-0.03	16.2
BV2	14	SM	25	40	226	200	0.15	0.85	104	0.30	64	3.5	0.997	-1.05	-0.26	13.7
BV2	14	PE	25	40	451	400	0.19	0.81	95	0.22	129	2.1	0.998	-0.22	-0.13	16.3
BV2	14	SM	25	40	451	400	0.16	0.84	98	0.20	681	5.5	0.995	-2.23	-1.16	14.3
BV2	14	SM	25	40	903	800	0.20	0.80	81	0.18	1779	3.7	0.998	-1.70	-2.08	17.3

EOM: exogenous organic matter; WHC: water holding capacity; DEOM: decomposable EOM; REOM: resistant EOM; HEOM: humified EOM; f: partitioning coefficient; K: decomposition constant rate (y^{-1}); SSR: sum of squared residuals; RMSE: root mean square error; R: coefficient of correlation; E: relative error; M: mean difference; CO_2-C: cumulative net CO_2-C emission in amended soil.

For EOM code refer to Table 3, for soil code refer to Table 2.

Table S4c. Incubation conditions, exogenous organic matter (EOM) pool parameters from model optimization, statistical indicators of model goodness of fit and cumulative net respiration for meat and bone meals.

EOM	Days	Soil	Temp °C	WHC	EOM rate µg C g^{-1}	EOM rate kg N ha^{-1}	f_{DEOM}	f_{REOM}	K_{DEOM}	K_{REOM}	SSR µg C g^{-1}	RMSE %	R	E %	M µg C g^{-1}	CO_2-C %
BV2	13	PE	20	40	87	100	0.17	0.83	85	1.66	3	1.7	0.999	0.02	0.00	18.2
BV2	14	SM	20	40	87	100	0.17	0.8301	73	0.39	7	2.8	0.998	-0.42	-0.04	15.3
BV2	14	SM	20	40	175	200	0.18	0.82	83	0.43	38	3.0	0.998	-0.73	-0.16	16.5
BV2	14	SM	20	40	349	400	0.17	0.83	88	0.63	253	3.9	0.998	-1.50	-0.63	16.5
BV2	14	SM	20	40	524	600	0.20	0.80	68	0.16	481	3.5	0.999	-1.46	-0.93	17.1
BV2	13	PE	20	40	175	200	0.17	0.83	91	1.00	7	1.4	0.999	0.00	0.00	16.1
BV2	13	PE	20	40	349	400	0.19	0.81	73	0.46	45	1.8	0.999	-0.21	-0.08	16.0
BV2	13	PE	20	40	524	600	0.19	0.81	73	0.31	85	1.7	0.999	-0.18	-0.10	15.6
BV2	9	SM	20	40	211	200	0.14	0.86	58	1.40	12	2.6	0.999	-0.23	-0.04	13.7
BV2	14	PE	25	40	844	800	0.15	0.85	121	1.36	210	1.5	0.999	0.03	0.04	17.0
BV2	16	PE	15	40	216	200	0.10	0.90	64	0.19	27	4.6	0.996	-1.11	-0.12	7.9
BV2	18	SM	15	40	216	200	0.10	0.90	74	0.20	56	5.6	0.996	-2.32	-0.30	8.5
BV2	16	PE	15	40	431	400	0.10	0.90	62	0.22	125	5.0	0.997	-1.65	-0.37	7.8
BV2	18	SM	15	40	431	400	0.12	0.88	62	0.16	268	5.8	0.997	-3.05	-0.83	9.4
BV2	13	PE	20	40	211	200	0.17	0.83	71	0.50	35	3.4	0.997	-1.08	-0.23	14.7
BV2	13	PE	20	40	422	400	0.15	0.85	62	0.17	58	2.7	0.999	-0.83	-0.29	11.8
BV2	9	SM	20	40	422	400	0.16	0.84	57	0.20	55	3.2	0.999	-1.22	-0.37	11.5
BV2	14	PE	20	40	844	800	0.12	0.88	97	0.61	213	2.3	0.998	-0.20	-0.14	11.1
BV2	14	SM	20	40	844	800	0.12	0.88	64	0.16	522	4.2	0.997	-1.61	-0.94	9.9
BV2	14	PE	25	40	211	200	0.14	0.86	96	0.35	7	1.4	0.999	0.04	0.01	12.5
BV2	14	SM	25	40	211	200	0.13	0.87	84	0.18	11	1.9	0.998	-0.17	-0.03	11.5
BV2	14	PE	25	40	422	400	0.14	0.86	96	0.38	22	1.2	0.999	0.00	0.00	12.4
BV2	14	SM	25	40	422	400	0.12	0.88	99	0.19	174	4.0	0.997	-1.65	-0.60	10.7
BV2	14	SM	25	40	844	800	0.16	0.84	74	0.19	1972	5.4	0.995	-2.87	-2.57	14.0
DE	9	GO	20	40	187	200	0.23	0.77	76	1.34	52	3.9	0.998	-0.96	-0.23	19.5
DE	9	BU	20	40	187	200	0.28	0.72	31	0.40	108	9.4	0.993	-4.89	-0.70	13.7
DE	12	BU	20	40	374	400	0.18	0.82	42	0.33	638	11	0.992	-5.63	-1.49	11.7
DE	9	GO	20	40	93	100	0.31	0.69	87	0.28	55	6.6	0.996	-3.57	-0.53	23.3
DE	9	SM	20	40	93	100	0.44	0.56	48	0.76	13	2.7	0.999	-0.25	-0.04	30.9
DE	9	SM	20	40	187	200	0.38	0.62	52	0.15	62	3.4	0.998	-0.58	-0.18	26.0
DE	9	LO	20	40	187	200	0.50	0.50	56	0.15	70	2.9	0.998	-0.45	-0.17	32.6
DE	9	SM	20	40	374	400	0.32	0.68	60	0.17	494	5.4	0.998	-3.36	-1.82	23.1
DE	9	GO	20	40	374	400	0.26	0.74	62	0.15	201	4.2	0.996	-0.64	-0.28	18.0
DE	12	LO	20	40	374	400	0.34	0.66	71	0.15	595	4.0	0.998	-1.34	-0.93	26.2
mean							0.20	0.80	76	0.41	2133	4.6	0.997	-1.73	-0.71	16.1
minimum							0.07	0.37	13	0.15	3	1.2	0.989	-11.18	-5.52	7.8
maximum							0.63	0.93	131	1.66	44765	16.1	0.999	0.75	2.11	38.6

EOM: exogenous organic matter; WHC: water holding capacity; DEOM: decomposable EOM; REOM: resistant EOM; HEOM: humified EOM; f: partitioning coefficient; K: decomposition constant rate (y^{-1}); SSR: sum of squared residuals; RMSE: root mean square error; R: coefficient of correlation; E: relative error; M: mean difference; CO_2-C: cumulative net CO_2-C emission in amended soil.

For EOM code refer to Table 3, for soil code refer to Table 2.

Table S5. Incubation conditions, exogenous organic matter (EOM) pool parameters from model optimization, statistical indicators of model goodness of fit and cumulative net respiration for animal residues.

EOM	Days	Soil	Temp °C	WHC	EOM rate %	C rate µg g^{-1}	f_{DEOM}	f_{REOM}	K_{DEOM}	K_{REOM}	SSR µg C g^{-1}	RMSE %	R	E %	M µg C g^{-1}	CO_2-C %
HL	27	JU	20	40	0.5	2288	0.12	0.88	92	1.09	27066	5.4	0.997	-3.88	-9.59	15.8
HL	27	LO	20	40	0.5	2288	0.21	0.79	82	0.35	14820	2.5	0.997	-0.30	-1.08	19.5
HL	25	SM	20	40	0.5	2288	0.13	0.87	28	0.58	8953	3.7	0.997	-0.05	-0.09	13.5
BLM	26	SM	20	40	0.5	2874	0.04	0.96	132	1.20	35527	7.9	0.983	-1.33	-2.72	12.2
BLM	27	JU	20	40	0.5	2874	0.06	0.94	144	0.87	38469	7.3	0.980	1.34	2.90	11.0
BLM	7	JU	20	40	0.5	2874	0.15	0.85	111	0.15	16407	9.4	0.991	-3.18	-6.55	10.7
BLM	27	LO	20	40	0.5	2874	0.22	0.78	110	0.45	75279	4.3	0.989	-0.43	-2.12	20.4
BLM	26	SM	20	40	1.0	5749	0.07	0.93	99	0.16	57885	6.3	0.983	-0.85	-2.80	7.2
BLM	26	SM	20	40	2.0	11497	0.05	0.95	131	0.15	99517	5.9	0.981	-0.81	-3.67	5.0
BLM	35	JU	10	20	0.5	2631	0.07	0.93	189	0.57	12399	5.4	0.993	-1.16	-1.58	6.8
BLM	35	JU	10	30	0.5	2631	0.07	0.93	139	0.15	11499	5.8	0.987	-0.15	-0.18	5.8
BLM	35	JU	10	40	0.5	2631	0.09	0.91	111	0.15	21366	6.3	0.985	0.68	1.04	7.2
BLM	36	JU	20	20	0.5	2631	0.10	0.90	185	0.63	4693	1.9	0.998	-0.18	-0.42	11.2
BLM	36	JU	20	30	0.5	2631	0.09	0.91	189	0.60	5951	2.2	0.996	-0.15	-0.35	11.4
BLM	36	JU	20	40	0.5	2631	0.10	0.90	155	0.80	11305	2.4	0.996	-0.15	-0.44	14.9
BLM	35	JU	30	20	0.5	2631	0.12	0.88	261	0.37	4466	1.8	0.996	0.55	1.51	12.6
BLM	35	JU	30	30	0.5	2631	0.12	0.88	259	0.24	3266	1.6	0.996	-0.05	-0.14	12.1
BLM	35	JU	30	40	0.5	2631	0.13	0.87	208	0.34	4569	1.6	0.997	-0.05	-0.15	15.1
BLM	27	JU	20	40	0.5	2692	0.15	0.85	119	0.69	17033	2.9	0.995	-0.32	-1.07	15.8
BLM	27	LO	20	40	0.5	2692	0.19	0.81	247	0.82	13951	2.0	0.995	-0.10	-0.43	19.7
BLM	25	SM	20	40	0.5	2692	0.07	0.93	284	1.21	16804	3.9	0.992	-0.21	-0.53	13.9
HHM	27	JU	20	40	0.5	2975	0.40	0.60	11	0.15	116849	8.6	0.998	-6.16	-19.78	20.3
HHM	27	LO	20	40	0.5	2975	0.28	0.72	25	0.15	126675	6.3	0.994	-0.90	-3.81	21.1
HHM	25	SM	20	40	0.5	2975	0.33	0.67	14	0.15	728880	20.2	0.987	-13.64	-44.80	20.6
HHM	35	JU	10	20	0.5	2565	0.04	0.96	12	2.51	56817	21.8	0.988	-16.44	-11.77	6.3
HHM	35	JU	10	30	0.5	2565	0.08	0.92	38	0.55	53050	17.9	0.990	-13.34	-11.26	6.3
HHM	35	JU	10	40	0.5	2565	0.14	0.86	17	0.28	10226	7.0	0.998	-3.71	-3.53	6.8
HHM	36	JU	20	20	0.5	2565	0.24	0.76	15	0.15	82303	9.3	0.996	-5.36	-10.73	13.8
HHM	36	JU	20	30	0.5	2565	0.22	0.78	15	0.15	61902	7.3	0.997	-3.62	-8.05	14.4
HHM	36	JU	20	40	0.5	2565	0.24	0.76	14	0.15	79363	7.0	0.998	-4.64	-12.00	16.6
HHM	35	JU	30	20	0.5	2565	0.13	0.87	13	0.29	19209	7.1	0.998	-4.35	-6.25	10.9
HHM	35	JU	30	30	0.5	2565	0.16	0.84	23	0.23	79358	8.8	0.993	-3.86	-9.11	14.6
HHM	35	JU	30	40	0.5	2565	0.19	0.81	18	0.20	58410	6.2	0.996	-2.71	-7.73	17.3
mean							0.15	0.85	106	0.50	59826	6.6	0.993	-2.71	-5.37	13.1
minimum							0.04	0.60	11	0.15	3266	1.6	0.980	-16.44	-44.80	5.0
maximum							0.40	0.96	284	2.51	728880	21.8	0.998	1.34	2.90	21.1

EOM: exogenous organic matter; WHC: water holding capacity; DEOM: decomposable EOM; REOM: resistant EOM; HEOM: humified EOM; f: partitioning coefficient; K: decomposition constant rate (y^{-1}); SSR: sum of squared residuals; RMSE: root mean square error; R: coefficient of correlation; E: relative error; M: mean difference; CO_2-C: cumulative net CO_2-C emission in amended soil. For EOM code refer to Table 3, for soil code refer to Table 2.

Table S6. Incubation conditions, exogenous organic matter (EOM) pool parameters from model optimization, statistical indicators of model goodness of fit and cumulative net respiration for crop residues, agro-industrial wastes and sewage sludges.

EOM	Days	Soil	Temp °C	WHC	EOM rate %	C rate µg g^{-1}	f_{DEOM}	f_{REOM}	f_{HEOM}	K_{DEOM}	K_{REOM}	SSR µg C g^{-1}	RMSE %	R	E %	M µg C g^{-1}	CO_2-C %
Crop residues (CR)																	
CC	26.7	LO	20	40	0.5	2529	0.09	0.91		75	1.53	2433	1.3	0.9996	0.21	0.62	17.4
CC	26.8	JU	20	40	0.5	2529	0.04	0.96		94	0.65	535	1.6	0.9993	0.21	0.24	7.2
CC	25.9	SM	20	40	0.5	2529	0.08	0.92		32	0.16	9406	6.0	0.9927	-3.23	-4.14	7.4
CC	25.9	SM	20	40	1.0	5058	0.04	0.96		72	0.31	6851	3.1	0.9959	-0.17	-0.35	5.7
CC	25.9	SM	20	40	2.0	10116	0.03	0.97		148	0.29	5785	1.8	0.9982	0.19	0.65	4.6
WS	26.7	LO	20	40	0.5	2748	0.17	0.83		26	0.94	8610	2.2	0.9990	-0.34	-1.06	18.4
WS	26.8	JU	20	40	0.5	2748	0.04	0.96		48	0.30	464	1.9	0.9991	-0.22	-0.20	5.1
WS	25.9	SM	20	40	0.5	2748	0.08	0.92		37	0.17	46962	12.9	0.9878	-6.62	-8.79	7.2
WS	25.9	SM	20	40	1.0	5495	0.05	0.95		28	0.15	14186	5.2	0.9944	-0.87	-1.56	4.8
WS	25.9	SM	20	40	2.0	10991	0.02	0.98		42	0.15	2561	1.8	0.9990	-0.02	-0.04	3.0
Agro-industrial wastes (AW)																	
TPOMW	26.7	LO	20	40	0.5	2796	0.06	0.75	0.19	230	2.40	1593	1.2	0.9995	-0.23	-0.60	17.5
TPOMW	26.5	JU	20	40	0.5	2796	0.03	0.79	0.19	119	0.81	845	1.8	0.9990	0.10	0.12	6.6
TPOMW	24.8	SM	20	40	0.5	2796	0.05	0.76	0.19	132	0.31	2978	3.3	0.9952	-1.60	-2.07	6.0
Sewage sludges (SS)																	
WW	28.8	SM	20	40	0.5	1920	0.04	0.96		45	0.31	177	1.2	0.9995	0.13	0.10	6.0
WW	28.8	PE	20	40	0.5	1920	0.04	0.96		83	0.26	203	1.5	0.9989	0.09	0.06	4.9
WW	28.8	LL	20	40	0.5	1920	0.03	0.97		62	0.15	260	2.0	0.9981	-0.10	-0.06	3.8
WW	28.8	AL	20	40	0.5	1920	0.04	0.96		62	0.15	1181	4.4	0.9975	3.49	2.19	4.5
CR	mean						0.06	0.94		60	0.47	9779	3.8	0.9965	-1.08	-1.32	8.5
	minimum						0.02	0.83		26	0.15	464	1.3	0.9878	-6.62	-8.79	3.0
	maximum						0.17	0.98		148	1.53	46962	12.9	0.9996	0.21	0.65	18.4
AW	mean						0.05	0.77	0.19	160	1.17	1805	2.1	0.9979	-0.57	-0.85	10.0
	minimum						0.03	0.75	0.19	119	0.31	845	1.2	0.9952	-1.60	-2.07	6.0
	maximum						0.06	0.79	0.19	230	2.40	2978	3.3	0.9995	0.10	0.12	17.5
SS	mean						0.04	0.96		63	0.22	455	2.3	0.9985	0.90	0.57	4.8
	minimum						0.03	0.96		45	0.15	177	1.2	0.9975	-0.10	-0.06	3.8
	maximum						0.04	0.97		83	0.31	1181	4.4	0.9995	3.49	2.19	6.0

EOM: exogenous organic matter; WHC: water holding capacity; DEOM: decomposable EOM; REOM: resistant EOM; HEOM: humified EOM; f: partitioning coefficient; K: decomposition constant rate (y^{-1}); SSR: sum of squared residuals; RMSE: root mean square error; R: coefficient of correlation; E: relative error; M: mean difference; CO_2-C: cumulative net CO_2-C emission in amended soil.

For EOM code refer to Table 3, for soil code refer to Table 2.