Table S1. Soil profiles morphology of the different research sites

Site : Miyake-jima Island
Investigators: Kenji Tamura, Xinhao Peng, Jo Jinno, Aya Takano, Minami Kawagoe

Latitude Longitude : 34°05'22.3N'', 139°30'49.7''E (IG7)
Altitude : 538 m (IG7)

34°05'28.3''N, 139°30'35.7''E (IG8)
443 m (IG8)

34°05'35.8''N, 139°30'22.1''E (IG9)
388 m (IG9)

Study site		Horizon	Depth(cm)	Color	Texture	Rock fragment	Structure	Consistence (Wet)	Hardness (mm)	Porosity	Root Bioactivity	Active aluminium
IG7	2007	C1d	0-34	5Y 3/2	S	FC·M	PL（0-3cm）	NS·NP	32	— —	N	+
		C2	34-52	5Y 2/2	S	FC·M/S·F	— —	NS·NP	14	— —	BP	±
		2A1	52-62	7.5YR 2/2	HC	N	SB·M	SS·P	15	V·TU·F	DP	+ +
		2A2	62-73	10YR 2/3	HC	FC·M	SB·W	SS·P	25	V·TU·M	N	+ +
		2B	73-87	7.5YR 3/3	SiC	N	SB·W	SS·P	18	V·TU·M	N	+ +
		3C	87-100+	7.5YR 1.7/1	SL	N	MA	NS·NP	28	— —	N	+ +
	2011	C1d	0-10	2.5Y 3/2	S	G·F	MA	NS·NP	25	— —	VF·VF	+
		C2d	10-30	5Y 3/2	S	FC·M	MA	NS·NP	30	— —	N	−
		C3	30-43	5Y 3/1	S	FC·M	— —	NS·NP	20	— —	VF·F	−
		2A1	43-55	10YR 2/3	LiC	N	SB·M/CR·M	SS·P	14	VE·F/V·TU·F	VF·F/F·VF	+ + +
		2A2	55-70	10YR 3/3	LiC	FC·C	SB·W	SS·SP	21	V·TU·F	VF·C/F·F	+ +
		2B	70-90	10YR 3/4	LiC	N	SB·W	SS·P	22	V·TU·F	VF·VF/F·VF	+ + +
		3C	90-100+	7.5YR 2/1	SL	N	MA	SS·SP	30	— —	N	+ +
	2019	A	0-7	2.5Y 3/1	CL	N	F·CR·M	SS·SP·FR	16	— —	VF·M/ F·M/ M·F	+++
		C1d	7-12	2.5Y 3/1	CL	N	MA	SS·SP·FR	22	— —	VF·VF	+++
		C2d	12-20	2.5Y 3/1	S	FC·M	— —	NS·NP	30	— —	N	++
		C3	20-33	2.5Y 3/1	S	FC·M	— —	NS·NP	21	— —	N	+
		C4	33-52	2.5Y 3/1	SL	FC·M	— —	NS·NP·L	13	— —	VF·C/ F·F	+
		2A1	52-61	7.5YR 2/2	LiC	N	F·SB·M	SS·SP·FR	15	V·TU·F	VF·C/ F·F	+++
		2A2	61-71	7.5YR 3/2	LiC	N	F·SB·M	SS·SP·FR	20	V·TU·F	VF·C	+++
		2BW	71-88	7.5YR 3/2	HC	N	F·SB·M	SS·P·FR	19	V·TU·F	VF·F	+++
		3C	88-100+	10R 2/1	LS	N	F·SB·W	NS·NP·L	26	V·TU·M	N	+++
IG8	2007	C1	0-5	5Y 3/1	CL	N	MA	SS·SP	12	— —	VF·M/F·M	±
		C2g	5-20	5Y 3/1	LiC	FC·M	MA	SS·SP	24	— —	N	−
		C3	20-30	5Y 3/2	LS	FC·M	— —	NS·NP	32	V·TU·F	N	−
		C4d	30-37	5Y 3/2	CL	FC·M	— —	SS·SP	16	— —	N	−
		2A	37-47	7.5YR 2/2	HC	N	F·SB·M	SS·P	19	V·TU·M	N	+ + +
		3C	47-55	5YR 2/2	S	scoria	— —	NS·NP	22	— —	N	+
		4B	55-72	7.5YR 3/4	HC	N	F·SB·W	SS·VP	17	V·TU·M	N	+ + +
		5C	72-92	7.5YR 1.7/1	SCL	N	MA	SS·SP	27	— —	N	+ +
		6C	92-100+	5P 1.7/1	SL	N	MA	NS·NP	24	— —	N	+ +
	2011	C1	0-6	2.5Y 3/3	CL	FC·F	— —	SS·SP	15	— —	/F·F/F·F/M·V	+ +
		C2dg	6-20	2.5Y 3/1	LiC	FC·F	MA	SS·SP	27	— —	VF·VF	−
		C3d	20-30	2.5Y 3/2	S	FC·M	MA	NS·NP	30	— —	VF·F/F·VF	±
		C4	30-38	2.5Y 3/2	S	FC·M	— —	NS·NP	16	— —	VF·F/F·F	±
		2A	38-48	7.5YR 2/2	LiC	N	SB·M	SS·P	17	V·TU·F	VF·M/F·F	+ + +
		3Cd	48-53	10YR 3/3	LS	N	MA	NS·NP	33	— —	VF·VF	+ + +
		4B	53-58	7.5YR 2/1	S	FC·G·M		NS·NP	23	— —	VF·VF	+ +
		5C	58-74	7.5YR 3/2	S	FC·G·C	SB·M	SS·P	16	V·TU·F	VF·F/F·F	+ + +
		6C	74-86	10YR 1.7/1	LS	N	MA	NS·NP	27	— —	N	+ + +
		7C	86-100+	10YR 1.7/1	LS	N	MA	NS·NP	27	— —	N	+ + +
	2019	A	0-3	7.5YR 2/2	CL	N	F·CR·S	SS·SP·FR	5	— —	VF·M/ M·M	+
		C1d	3-18	5Y 2/2	CL	N	MA	SS·SP·FR	20	V·TU·F/ F·TU·F	VF·VF	±
		C2	18-40	2.5Y 3/1	LS	FC·M	— —	NS·NP	26	— —	VF·M/ M·F	±
		2A	40-51	10YR 2/3	HC	N	F·SB·M/F·CR·M	SS·P·FR	16	V·TU·C	VF·VF/ M·F	+++
		3C	51-58	7.5YR 2/3	S	FC·M	— —	NS·NP	22	— —	N	+++
		4B	58-72	10YR 3/4	SiCL	N	F·SB·M	SS·SP·FI	12	— —	M·F	+++
		5C	72-100+	2.5Y 2/1	LS	N	MA	NS·NP·FR	26	V·TU·F	N	+++
IG9	2007	C1	0-10	2.5Y 3/2	SCL	N	MA	SS·SP	31	V·TU·F	VF·M	±
		C2	10-20	2.5Y 3/2	LiC	FC·M	F·CR·M	SS·SP	12		VF·VF	±
		2A	20-29	10YR 2/2	HC	N	F·SB·S	SS·P	15	VE·C/V·TU·F	VF·M/F·C	+ +
		2B	29-45	10YR 2/3	LiC	N	F·SB·M	SS·P	17	V·TU·C/F·TU·C	VF·C/F·F	+ + +
		3C	45-50	10YR 3/3	S	scoria	— —		20		VF·VF	+
		4B	50-66	7.5YR 2/3	LiC	N	F·SB·W	SS·P	23	V·TU·M	VF·F/F·F	+ + +
		5B	66-73	7.5YR 1.7/1	L	N	PL	SS·SP	32	V·TU·M	VF·F/F·F	+ + +
		6C	73-100+	10YR 1.7/1	LS	N	MA		20	V·TU·F	VF·VF	+
	2011	A	0-4	10YR 2/2	LiC	N	SB·M	SS·P	10	V·TU·C	VF·M/F·M	−
		C1g	4-10	2.5Y 3/2	CL	FC·F	MA	SS·SP	26	V·TU·F	VF·F/F·F	−
		C2	10-20	2.5Y 3/2	SL	FC·M	MA	NS·NP	26	— —	VF·VF	±
		2A1	20-30	10YR 2/2	LiC	N	SB·M	SS·SP	16	V·F·M·TU·M	VF·M/F·C	+ + +
		2A2	30-41	10YR 2/3	LiC	FC·M	SB·W	SS·P	20	V·TU·C/F·TU·C	VF·M/F·C	+ + +
		3B	41-60	10YR 3/3	LiC	N	SB·M	SS·P	21	V·F·M·TU·M	VF·M/F·C	+ + +
		4C	60-65	7.5YR 2/3	LiC	N	MA	SS·SP	25	V·TU·F	VF·F	+ + +
		5C	65-80	7.5YR 1.7/1	LS	N	MA	NS·NP	27	V·TU·F	VF·F	+ + +
		6C	80-100+	10YR 1.7/1	S	N	MA	NS·NP	23	— —	N	+ +
	2019	A	0-7	10YR 2/2	LiC	N	F·SB·W/F·CR·M	SS·P·FR	11	V·TU·C	VF·M/ F·M/ M·F	+ +
		Cd	7-20	2.5Y 3/1	LiC	FC·F	MA	SS·P·FR	26	V·TU·F/ F·VE·F	F·F	+
		2A	20-30	7.5YR 2/2	LiC	FC·F	F·SB·M/ F·CR·M	SS·P·FR	13	V·TU·C	VF·F	+++
		3C	30-38	7.5YR 2/3	LS	FC·M	— —	NS·NP	17	— —	VF·F/ F·F/ M·F	+++
		4B	38-58	7.5YR 2/4	LiC	N	MA	SS·P·FR	21	V·TU·F	F·F/ M·F	+++
		5C	58-77	7.5YR 2/2	CL	N	MA	NS·P·FI	24	V·TU·F	VF·VF	+++
		6C	77-100+	2.5YR 1.7/1	SCL	N	MA	NS·NP·FR	20	V·TU·F	N	++

Texture: CL=Clay loam; S=Sand; SL=Sandy loam; LiC=Light clay; HC=Heavy clay; LS=Loamy sand; SiCL=Silty clay loam; SCL=Sandy clay loam;
Rock fragment: N=None, FC=Fine gravel, G=Gravel, S=Stone; M=Many, F=Few, C=Common;
Structure: W=Weak, M=Moderate, S=Strong; F=Fine; CR=Crumb, SB=Subangular blocky, MA=Massive;
Consistence: NS=Non sticky, SS=Slightly sticky; NP=Non plastic, SP=Slightly plastic, P=Plastic, VP=Very plastic; L=Loose, FR=Friable, FI=Firm;
Porosity: V=Very fine, F=Fine, M=Medium; TU=Tubular, VE=Vesicular; F=Few, C=Common, M=Many;
Root Bioactivity: N=None, VF=Very fine, F=Fine, M=Medium; VF=Very few, F=Few, C=Common, M=Many; BP=Some buried plants, DP=Some dead plants

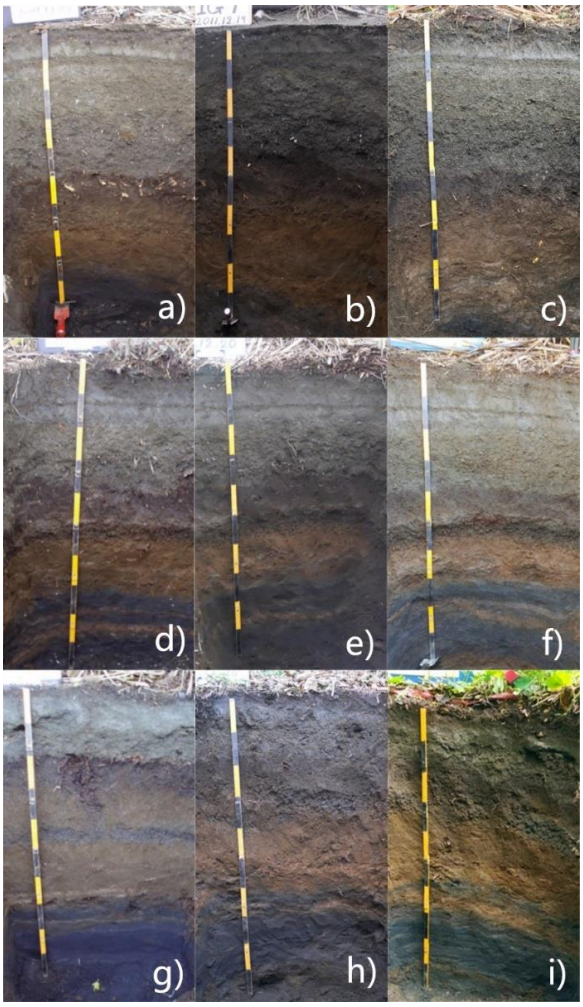

Figure S1. Soil profile photos of the different research sites. a) IG7 in 2007; b) IG7 in 2011; c) IG7 in 2019; d) IG8 in 2007; e) IG8 in 2011; f) IG8 in 2019; g) IG9 in 2007; h) IG9 in 2011; i) IG9 in 2019