

SUPPLEMENTARY MATERIAL

Effect of land management intensity on soil quality of Andisol in the Upper Brantas Watershed, Batu, Indonesia

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Table S1. Indicators of physical, chemical and biological properties of Andisols of Brantas Watershed Upstream Batu City, Indonesia

Type land use	Slope (%)	pH	N-total (%)	P-available (ppm)	K-exchangeable (cmol·kg ⁻¹)	C-organic (%)	Bulk density (g·cm ⁻¹)	Soil specific gravity (g·cm ⁻¹)	Porosity	Sand	Dust	Clay	MBC (mg·kg ⁻¹)
									%				
PF	K1	6.1 ±0.2	1.2 ±0.02	42.9 ±1.5	0.75 ±0.03	11.2 ±0.4	0.59 ±0.05	1.79 ±0.11	66.9 ±2.4	48 ±1.2	38 ±1.5	14 ±0.6	79.3 ±1.8
	K2	6.3 ±0.1	1.1 ±0.07	41.3 ±0.5	0.74 ±0.02	10.5 ±1.2	0.63 ±0.02	1.74 ±0.01	64.2 ±1.1	49 ±3.1	37 ±2.6	14 ±0.6	77.7 ±4.5
	K3	6.3 ±0.6	1.2 ±0.04	42.2 ±0.8	0.69 ±0.06	9.9 ±0.8	0.65 ±0.02	1.84 ±0.05	64.9 ±0.8	54 ±2.5	33 ±3.1	13 ±1.0	67.9 ±2.0
	K4	5.5 ±0.2	1.1 ±0.12	38.5 ±1.1	0.51 ±0.08	9.7 ±0.4	0.67 ±0.02	1.86 ±0.05	63.7 ±0.2	53 ±1.2	34 ±1.5	13 ±0.6	69.2 ±2.2
	K5	5.5 ±0.4	0.9 ±0.02	34.8 ±0.7	0.46 ±0.05	8.7 ±0.8	0.68 ±0.01	1.83 ±0.08	62.8 ±1.2	54 ±2.1	33 ±1.5	13 ±0.6	70.4 ±1.0
PCA	K1	5.5 ±0.2	0.6 ±0.01	32.1 ±0.8	0.39 ±0.02	7.9 ±0.6	0.81 ±0.05	2.07 ±0.22	60.7 ±2.3	52 ±2.3	33 ±3.1	15 ±1.2	51.8 ±1.6
	K2	5.2 ±0.1	0.5 ±0.09	29.8 ±1.0	0.33 ±0.02	5.9 ±1.2	0.82 ±0.02	2.04 ±0.13	59.9 ±1.5	50 ±3.5	36 ±2.0	14 ±2.0	48.9 ±1.8
	K3	5.1 ±0.1	0.4 ±0.03	27.1 ±0.3	0.32 ±0.02	5.3 ±0.1	0.83 ±0.02	2.05 ±0.14	59.5 ±1.7	53 ±1.2	34 ±2.0	13 ±1.2	44.5 ±1.5
	K4	5.3 ±0.1	0.4 ±0.07	26.8 ±0.4	0.28 ±0.02	4.6 ±0.3	0.85 ±0.03	2.11 ±0.15	59.7 ±1.3	54 ±6.4	33 ±5.0	13 ±1.2	40.7 ±0.9
	K5	5.1 ±0.1	0.4 ±0.05	25.5 ±1.5	0.29 ±0.02	4.4 ±0.2	0.85 ±0.02	2.12 ±0.03	60.3 ±1.2	54 ±2.3	34 ±2.0	12 ±0.1	45.3 ±3.6
PGA	K1	5.2 ±0.5	0.6 ±0.07	24.2 ±0.8	0.32 ±0.05	5.7 ±0.7	0.89 ±0.02	1.99 ±0.05	55.2 ±1.4	52 ±1.5	35 ±0.6	13 ±1.0	42.4 ±0.8
	K2	4.7 ±0.2	0.6 ±0.18	22.9 ±0.3	0.37 ±0.02	3.4 ±1.3	0.91 ±0.02	2.19 ±0.09	58.5 ±1.1	54 ±2.2	33 ±1.2	13 ±1.2	39.4 ±1.9
	K3	4.6 ±0.3	0.6 ±0.05	22.2 ±0.6	0.32 ±0.05	3.2 ±0.6	0.89 ±0.01	2.02 ±0.04	55.9 ±0.6	50 ±4.2	38 ±4.4	12 ±0.6	36.0 ±7.8
	K4	4.9 ±0.3	0.3 ±0.05	21.8 ±0.9	0.22 ±0.01	2.3 ±0.1	0.91 ±0.02	2.24 ±0.05	59.9 ±1.5	56 ±3.1	32 ±3.0	12 ±0.6	26.4 ±0.5
	K5	4.8 ±0.3	0.2 ±0.01	18.9 ±1.6	0.24 ±0.02	2.3 ±0.2	0.92 ±0.03	2.21 ±0.04	58.5 ±1.4	54 ±2.3	34 ±2.1	12 ±0.6	26.2 ±0.7
PHA	K1	5.4 ±0.1	0.3 ±0.01	23.8 ±0.2	0.51 ±0.01	3.3 ±0.6	0.68 ±0.02	1.71 ±0.05	60.5 ±0.3	51 ±2.3	37 ±2.3	12 ±0.1	35.9 ±0.1
	K2	5.1 ±0.8	0.3 ±0.02	21.1 ±0.4	0.44 ±0.07	2.6 ±0.3	0.69 ±0.02	1.77 ±0.05	60.8 ±0.8	48 ±1.2	39 ±1.2	13 ±0.1	28.5 ±4.2
	K3	5.2 ±0.2	0.2 ±0.03	19.9 ±0.6	0.34 ±0.05	2.7 ±0.8	0.77 ±0.05	2.10 ±0.11	63.1 ±1.8	52 ±4.2	35 ±3.2	13 ±1.0	31.2 ±6.1
	K4	5.1 ±0.6	0.3 ±0.06	18.4 ±0.9	0.31 ±0.03	2.9 ±0.4	0.82 ±0.04	2.03 ±0.01	59.7 ±1.8	55 ±2.1	34 ±2.1	11 ±0.1	26.6 ±2.1
	K5	4.5 ±0.2	0.2 ±0.01	15.5 ±1.2	0.26 ±0.04	2.5 ±0.4	0.83 ±0.02	2.04 ±0.07	59.5 ±0.7	57 ±2.5	32 ±2.5	11 ±0.6	24.7 ±1.4

continue Tab. S1

Type land use	Slope (%)	pH	N-total (%)	P- available (ppm)	K- exchangeable (cmol·kg ⁻¹)	C-organic (%)	Bulk density (g·cm ⁻¹)	Soil specific gravity (g·cm ⁻¹)	Porosity	Sand	Dust	Clay	MBC (mg·kg ⁻¹)
									%				
FP	K1	5.6 ±0.2	0.6 ±0.05	23.5 ±0.3	0.48 ±0.03	3.8 ±0.5	0.92 ±0.03	2.01 ±0.06	55.1 ±1.5	48 ±2.3	39 ±3.1	13 ±1.2	32.6 ±1.8
	K2	5.9 ±0.1	0.4 ±0.03	24.4 ±0.9	0.48 ±0.08	3.4 ±0.1	0.91 ±0.02	2.18 ±0.09	58.4 ±1.1	57 ±7.6	31 ±7.6	12 ±0.1	37.4 ±3.3
	K3	5.2 ±0.1	0.2 ±0.01	24.1 ±0.5	0.42 ±0.04	3.6 ±0.2	0.89 ±0.01	2.03 ±0.05	56.1 ±1.3	56 ±2.2	32 ±1.0	12 ±1.0	33.5 ±3.8
	K4	5.2 ±0.1	0.2 ±0.02	20.4 ±0.4	0.26 ±0.03	3.9 ±0.3	0.90 ±0.02	2.23 ±0.05	59.8 ±1.6	52 ±2.3	37 ±2.6	11 ±0.6	34.7 ±1.7
	K5	5.4 ±0.1	0.2 ±0.02	18.9 ±1.6	0.24 ±0.04	3.8 ±0.2	0.92 ±0.03	2.21 ±0.04	58.5 ±1.4	54 ±5.2	34 ±4.4	12 ±1.0	34.1 ±2.2
UF	K1	6.7 ±0.2	0.2 ±0.02	22.5 ±0.3	0.29 ±0.04	2.5 ±0.3	0.68 ±0.02	1.71 ±0.05	60.5 ±0.3	48 ±5.3	39 ±4.2	13 ±1.2	31.1 ±2.4
	K2	5.5 ±0.4	0.2 ±0.02	22.3 ±0.5	0.23 ±0.02	3.4 ±0.1	0.69 ±0.02	1.77 ±0.05	60.8 ±0.8	56 ±5.1	31 ±5.0	13 ±1.2	33.3 ±2.2
	K3	5.1 ±0.4	0.2 ±0.02	21.4 ±0.4	0.16 ±0.03	3.3 ±0.4	0.77 ±0.05	2.10 ±0.11	63.1 ±1.8	59 ±1.2	29 ±1.2	12 ±0.0	29.7 ±3.4
	K4	5.4 ±0.5	0.2 ±0.04	14.2 ±0.6	0.12 ±0.01	2.4 ±0.5	0.82 ±0.04	2.05 ±0.03	60.3 ±1.4	54 ±4.2	35 ±4.6	11 ±1.2	29.6 ±5.9
	K5	4.9 ±0.5	0.2 ±0.02	12.6 ±0.5	0.13 ±0.02	2.7 ±1.2	0.83 ±0.02	2.10 ±0.04	60.6 ±1.3	56 ±1.5	34 ±1.2	10 ±0.6	27.3 ±6.4

Explanations: MBC = microbial biomass carbon, K1 = 0–8%: nearly flat to gently sloping, K2 = 8–15%: moderately sloping, K3 = 15–25%: strongly sloping, K4 = 25–40%: steep slopes, K5 = over 40%: very steep slopes, PF = protected forest, PCA = pine-coffe agroforestry, PGA = pine-grass agroforestry, PHA = pine-horticulture agroforestry, FP = fruit plantation, UF = upland farming.

Source: own study.