

Table S1. Soil physical properties in different thinning treatments

Indicator	Soil depth (cm)	Thinning treatments			Indicator	Soil depth (cm)	Thinning treatments		
		Control	MT	HT			Control	MT	HT
BD (g cm ⁻³)	0-10	1.11±0.02 ^a	1.07±0.02 ^{ab}	1.01±0.03 ^b	MIWH (%)	0-10	29.9±1.9 ^a	31.8±1.6 ^a	34.6±1.3 ^a
	10-20	1.28±0.02 ^a	1.24±0.03 ^{ab}	1.16±0.02 ^b		10-20	26.1±0.8 ^a	27.8±0.2 ^a	29.3±0.6 ^a
	20-40	1.28±0.04 ^a	1.32±0.04 ^a	1.25±0.05 ^a		20-40	25.9±1.1 ^a	25.4±2.1 ^a	27.1±0.3 ^a
	40-60	1.32±0.02 ^a	1.27±0.03 ^a	1.33±0.02 ^a		40-60	25.4±1.2 ^a	26.1±1.4 ^a	24.7±0.5 ^a
	Mean	1.24±0.02 ^a	1.23±0.01 ^a	1.19±0.02 ^a		Mean	26.8±1.1 ^a	27.8±0.4 ^a	28.9±0.1 ^a
	CV(%)	8.25±1.81 ^a	8.76±1.7 ^a	10.91±0.36 ^a		CV(%)	7.7±1.2 ^b	10.3±4.1 ^{ab}	14.5±0.1 ^a
CWH (%)	0-10	32.5±1.0 ^b	34.2±1.5 ^{ab}	37.9±0.9 ^a	SWC (%)	0-10	18.6±1.9 ^a	19.5±2.1 ^a	19.2±1.6 ^a
	10-20	28.0±0.8 ^a	30.1±0.6 ^a	31.6±0.5 ^a		10-20	17.2±1.1 ^a	17.6±1.3 ^a	18.0±0.9 ^a
	20-40	27.8±1.5 ^a	26.9±2.5 ^a	29.0±0.6 ^a		20-40	19.6±0.8 ^a	19.2±0.5 ^a	20.1±0.7 ^a
	40-60	27.4±0.5 ^a	28.0±1.3 ^a	26.6±0.8 ^a		40-60	21.0±0.4 ^a	21.5±0.3 ^a	20.9±0.3 ^a
	Mean	28.9±1.3 ^a	29.8±0.5 ^a	31.1±0.1 ^a		Mean	19.1±0.7 ^a	19.5±0.5 ^a	19.6±0.8 ^a
	CV(%)	8.3±0.8 ^b	10.8±3.6 ^{ab}	14.7±0.4 ^a		CV(%)	8.4±0.5 ^a	8.2±0.6 ^a	6.4±0.4 ^a
CP (%)	0-10	15.7±2.2 ^b	16.3±1.8 ^{ab}	19.6±1.5 ^a	ST (°C)	0-10	20.5±2.1 ^a	20.7±2.3 ^a	20.8±1.7 ^a
	10-20	10.0±1.9 ^{ab}	8.6±1.1 ^b	11.1±1.5 ^a		10-20	20.3±1.7 ^a	20.4±1.5 ^a	20.4±1.2 ^a
	20-40	9.2±2.0 ^a	9.1±0.9 ^a	10.2±2.1 ^a		20-40	19.6±0.8 ^a	19.6±0.6 ^a	19.7±0.9 ^a
	40-60	8.9±2.3 ^a	7.5±2.8 ^a	8.6±0.6 ^a		40-60	19.2±0.3 ^a	19.2±0.4 ^a	19.3±0.3 ^a
	Mean	11.0±2.3 ^a	10.4±0.7 ^a	11.4±2.0 ^a		Mean	19.9±1.3 ^a	20.0±1.1 ^a	20.1±0.9 ^a
	CV(%)	29.1±2.1 ^a	38.5±5.3 ^a	36.6±2.1 ^a		CV(%)	3.1±0.2 ^b	3.5±0.3 ^{ab}	3.3±0.2 ^a
NCP (%)	0-10	35.6±3.9 ^a	36.6±1.2 ^a	38.2±1.8 ^a	Silt (%)	0-10	63.3±2.0 ^a	64.3±1.0 ^a	62.0±0.6 ^a
	10-20	35.9±1.6 ^a	37.1±0.2 ^a	36.7±0.3 ^a		10-20	64.4±0.8 ^a	65.1±1.3 ^a	64.1±0.5 ^a
	20-40	35.6±1.5 ^a	35.3±2.1 ^a	36.5±1.2 ^a		20-40	64.2±0.9 ^a	65.6±1.4 ^a	65.4±2.3 ^a
	40-60	36.1±1.8 ^a	35.6±1.9 ^a	35.3±1.2 ^a		40-60	65.1±1.0 ^a	67.8±0.7 ^a	67.7±1.6 ^a
	Mean	35.8±2.1 ^a	36.2±0.6 ^a	36.6±1.2 ^a		Mean	64.3±1.4 ^a	65.7±1.2 ^a	64.8±1.2 ^a
	CV(%)	0.6±0.5 ^b	2.3±1.8 ^{ab}	3.2±0.2 ^a		CV(%)	4.0±1.4 ^a	2.3±0.4 ^a	3.6±0.5 ^a
TPO (%)	0-10	51.3±0.9 ^b	52.8±1.1 ^{ab}	57.8±1.3 ^a	Clay (%)	0-10	1.9±0.1 ^a	1.9±0.1 ^a	1.9±0.1 ^a
	10-20	45.9±0.3 ^a	45.8±1.2 ^a	47.8±1.5 ^a		10-20	2.1±0.1 ^a	2.2±0.3 ^a	2.0±0.1 ^a
	20-40	44.9±0.8 ^a	44.5±1.1 ^a	46.7±1.2 ^a		20-40	2.4±0.2 ^a	2.5±1.2 ^a	2.2±0.2 ^a
	40-60	44.9±0.6 ^a	42.6±1.2 ^a	43.9±0.6 ^a		40-60	2.9±0.3 ^a	3.4±0.2 ^a	2.8±0.1 ^a
	Mean	46.8±0.5 ^a	46.4±1.0 ^a	48.8±0.8 ^a		Mean	2.3±0.1 ^a	2.5±0.7 ^a	2.2±0.1 ^a
	CV(%)	6.6±0.6 ^a	9.6±0.8 ^a	11.4±0.6 ^a		CV(%)	25.8±3.6 ^a	25.0±14.7 ^a	17.5±0.1 ^a
MAWH (%)	0-10	49.7±1.8 ^a	49.4±0.6 ^a	52.7±0.8 ^a	Sand (%)	0-10	34.8±2.0 ^a	33.7±1.1 ^a	36.1±0.6 ^a
	10-20	35.8±0.5 ^b	37.1±0.7 ^{ab}	41.1±0.9 ^a		10-20	33.5±0.9 ^a	32.7±0.6 ^a	33.8±0.5 ^a
	20-40	35.1±1.1 ^a	33.8±2.1 ^a	37.4±2.3 ^a		20-40	33.5±0.9 ^a	31.9±1.3 ^a	32.4±2.4 ^a
	40-60	34.1±1.5 ^a	32.8±0.6 ^a	33.1±0.5 ^a		40-60	32.1±1.3 ^a	28.8±0.9 ^a	29.6±1.7 ^a
	Mean	38.7±0.9 ^a	38.3±0.5 ^a	41.1±0.6 ^a		Mean	33.5±1.3 ^a	31.8±1.9 ^a	32.9±1.2 ^a
	CV(%)	19.1±1.6 ^a	19.9±1.2 ^a	20.5±0.4 ^a		CV(%)	9.8±3.0 ^a	6.6±2.2 ^a	8.3±1.9 ^a

BD—bulk density, MAWH—maximum water holding capacity, CWH—capillary water holding capacity, MIWH—minimum water holding capacity, CP—capillary porosity, NCP—no-capillary porosity, TPO—total porosity, SWC—soil water content, ST—soil

temperature, mean \pm SD

Table S2. Soil chemical properties in different thinning treatments

Indicator	Soil depth (cm)	Thinning treatments			Indicator	Soil depth (cm)	Thinning treatments		
		Control	MT	HT			Control	MT	HT
SOM (g·kg ⁻¹)	0-10	32.84±1.27 ^a	34.74±0.86 ^a	37.15±0.91 ^a	Ca (g·kg ⁻¹)	0-10	0.28±0.03 ^a	0.35±0.04 ^a	0.28±0.03 ^a
	10-20	20.72±0.48 ^a	19.4±0.59 ^a	21.98±0.63 ^a		10-20	0.21±0.02 ^a	0.26±0.01 ^a	0.29±0.02 ^a
	20-40	13.02±0.62 ^a	12.35±0.58 ^a	12.2±0.45 ^a		20-40	0.21±0.01 ^{ab}	0.26±0.02 ^a	0.14±0.02 ^b
	40-60	9.62±0.35 ^a	8.84±0.26 ^a	10.59±0.35 ^a		40-60	0.19±0.01 ^{ab}	0.22±0.01 ^a	0.13±0.02 ^b
	Mean	19.05±0.73 ^a	18.83±0.81 ^a	20.48±0.69 ^a		Mean	0.22±0.02 ^a	0.27±0.02 ^a	0.21±0.02 ^a
	CV(%)	54.07±2.15 ^b	60.95±1.83 ^a	59.57±2.09 ^a		CV(%)	27.22±1.28 ^b	20.18±1.09 ^c	41.33±1.41 ^a
TN (g·kg ⁻¹)	0-10	0.78±0.12 ^b	1.13±0.08 ^{ab}	1.25±0.09 ^a	Mg (g·kg ⁻¹)	0-10	2.49±0.08 ^a	2.52±0.11 ^a	2.42±0.12 ^a
	10-20	0.61±0.09 ^a	0.79±0.07 ^a	0.83±0.06 ^a		10-20	2.74±0.12 ^a	1.61±0.08 ^b	2.62±0.08 ^a
	20-40	0.52±0.07 ^a	0.58±0.03 ^a	0.66±0.07 ^a		20-40	2.69±0.09 ^a	2.22±0.12 ^a	2.69±0.05 ^a
	40-60	0.49±0.04 ^a	0.47±0.05 ^a	0.61±0.03 ^a		40-60	2.94±0.05 ^b	2.66±0.15 ^b	3.67±0.07 ^a
	Mean	0.60±0.05 ^b	0.78±0.06 ^a	0.80±0.06 ^a		Mean	2.72±0.10 ^{ab}	2.25±0.11 ^b	2.85±0.09 ^a
	CV(%)	21.73±3.29 ^c	44.24±4.32 ^a	29.81±2.68 ^b		CV(%)	6.81±3.41 ^b	20.69±2.59 ^a	19.60±3.15 ^a
TP (g·kg ⁻¹)	0-10	0.20±0.03 ^a	0.22±0.03 ^a	0.29±0.03 ^a	Mn (mg·kg ⁻¹)	0-10	0.09±0.01 ^a	0.11±0.01 ^a	0.11±0.01 ^a
	10-20	0.16±0.02 ^a	0.21±0.02 ^a	0.19±0.02 ^a		10-20	0.09±0.01 ^a	0.13±0.01 ^a	0.12±0.01 ^a
	20-40	0.19±0.02 ^{ab}	0.15±0.01 ^b	0.26±0.03 ^a		20-40	0.11±0.02 ^a	0.17±0.02 ^a	0.13±0.01 ^a
	40-60	0.21±0.01 ^a	0.19±0.02 ^a	0.24±0.01 ^a		40-60	0.11±0.01 ^a	0.19±0.02 ^a	0.15±0.02 ^a
	Mean	0.19±0.02 ^a	0.19±0.02 ^a	0.25±0.02 ^a		Mean	0.10±0.01 ^a	0.15±0.02 ^a	0.13±0.01 ^a
	CV(%)	11.37±1.76 ^b	16.08±1.25 ^a	17.16±1.69 ^a		CV(%)	11.55 ±2.51 ^b	23.34±3.58 ^a	13.39±3.02 ^b
TK (g·kg ⁻¹)	0-10	15.13±0.41 ^a	14.02±0.62 ^a	15.41±0.61 ^a	Cu (mg·kg ⁻¹)	0-10	20.6±1.1 ^a	18.7±0.9 ^a	23.2±1.1 ^a
	10-20	16.22±0.76 ^{ab}	15.10±0.35 ^b	18.19±0.39 ^a		10-20	23.6±1.3 ^a	20.4±1.3 ^a	25.1±1.0 ^a
	20-40	17.55±0.53 ^a	16.25±0.48 ^a	18.73±0.52 ^a		20-40	24.8±1.2 ^{ab}	21.1±1.0 ^b	28.1±1.5 ^a
	40-60	19.16±0.32 ^a	19.30±0.51 ^a	23.47±0.43 ^a		40-60	25±0.9 ^{ab}	23.5±1.4 ^b	29.6±0.9 ^a
	Mean	16.94±0.74 ^a	16.41±0.65 ^a	18.95±0.54 ^a		Mean	23.5±1.1 ^{ab}	20.9±1.1 ^b	26.5±1.2 ^a
	CV(%)	10.18±2.03 ^b	11.55±1.86 ^b	17.75±2.61 ^a		CV(%)	8.6 ±0.9 ^a	9.5 ±1.2 ^a	10.9±0.8 ^a
AN (mg·kg ⁻¹)	0-10	89.42±5.83 ^b	106.02±6.28 ^{ab}	123.01±7.46 ^a	Zn (mg·kg ⁻¹)	0-10	57.8±2.6 ^b	60.9±1.8 ^b	72.6±2.3 ^a
	10-20	51.08±4.95 ^b	63.29±4.62 ^{ab}	72.7±4.15 ^a		10-20	64.3±1.5 ^{ab}	63.6±1.2 ^b	68.8±1.7 ^a
	20-40	43.12±3.43 ^a	45.62±3.21 ^a	38.03±2.86 ^a		20-40	64.2±1.8 ^b	64.7±1.3 ^b	71.7±1.2 ^a
	40-60	21.40±2.08 ^a	25.01±2.11 ^a	27.1±1.93 ^a		40-60	60.6±0.6 ^b	63.1±0.9 ^{ab}	70.3±0.7 ^a
	Mean	51.23±4.26 ^b	59.99±5.18 ^{ab}	65.21±5.82 ^b		Mean	61.7±1.3 ^b	63.1±1.2 ^b	70.8±1.3 ^a
	CV(%)	55.35±3.64 ^b	57.43±4.65 ^{ab}	66.18±6.14 ^a		CV(%)	5.1±1.2 ^a	2.5±0.9 ^a	2.4±1.1 ^a
AK (mg·kg ⁻¹)	0-10	67.9±3.15 ^a	60.9±3.05 ^{ab}	56.3±2.43 ^b	Fe (mg·kg ⁻¹)	0-10	30.6±1.9 ^a	26.8±1.4 ^a	31.1±2.7 ^a
	10-20	54.3±1.52 ^a	46.8±2.31 ^b	45.2±1.06 ^b		10-20	33.7±1.2 ^a	28.4±1.1 ^a	35.3±1.5 ^a
	20-40	47±2.06 ^a	33.95±1.53 ^b	38.1±1.21 ^b		20-40	34.9±1.7 ^{ab}	30.1±0.8 ^b	38.9±1.1 ^a
	40-60	39.7±1.63 ^a	31.9±1.78 ^b	33.7±0.87 ^b		40-60	36.4±0.8 ^{ab}	33.7±1.0 ^b	40.5±1.4 ^a
	Mean	52.23±2.16 ^a	43.39±1.89 ^b	43.33±1.58 ^b		Mean	33.9±1.5 ^{ab}	29.8±1.1 ^b	36.5±1.6 ^a
	CV(%)	23.04±2.59 ^b	30.90±1.96 ^a	22.76±1.73 ^b		CV(%)	7.3±1.8 ^b	9.9±1.2 ^{ab}	11.5±1.6 ^a
AP (mg·kg ⁻¹)	0-10	1.51±0.06 ^a	1.65±0.05 ^a	1.43±0.06 ^a	pH	0-10	4.66±0.04 ^a	4.74±0.03 ^a	4.69±0.04 ^a
	10-20	1.05±0.03 ^a	1.02±0.02 ^a	0.92±0.05 ^a		10-20	4.75±0.02 ^a	4.50±0.03 ^a	4.82±0.02 ^a
	20-40	0.76±0.05 ^a	0.81±0.04 ^a	0.69±0.03 ^a		20-40	4.78±0.02 ^a	4.87±0.01 ^a	4.83±0.03 ^a
	40-60	0.56±0.02 ^a	0.64±0.02 ^a	0.51±0.03 ^a		40-60	4.78±0.01 ^a	4.91±0.02 ^a	4.82±0.02 ^a
	Mean	0.97±0.04 ^a	1.03±0.05 ^a	0.86±0.05 ^a		Mean	4.74±0.02 ^a	4.76±0.02 ^a	4.79±0.03 ^a
	CV(%)	42.51±2.36 ^b	42.87±1.93 ^b	50.38±2.61 ^a		CV(%)	1.20±1.52 ^a	3.89±1.31 ^a	1.40±0.65 ^a

SOM—soil organic matter, TN—total nitrogen, AN—alkali-hydrolysable nitrogen, TP—

total phosphorus, AP—available phosphorus, TK—total potassium, AK—available potassium, Ca—calcium, Mg—magnesium, Cu—copper, Zn—zinc, Fe—iron, Mn—manganese, pH—hydrogen ion concentration