

Supplementary Materials

Table S1. Soil physic-chemical properties at 0-5cm depth in Feb, May, and Aug in 2018 as affected by thinning, understory removal, and their interaction. SWC (%), pH, AP(mg/kg), TN(g/kg), TP(g/kg), SOC(g/kg) stand for soil water content, soil pH, soil available phosphorus content, soil total nitrogen, soil total phosphorus, and soil organic carbon, respectively. NO₃⁻(mg/kg), NH₄⁺(mg/kg), C:N, C:P, N:P stand for soil nitrate content, soil ammonium content, and stoichiometric ratios among soil organic carbon, total nitrogen, and total phosphorus, respectively.

Note: Values are means ± SE, n=4. For comparisons of treatments, means followed by different lowercase letters in a column are significantly different ($P < 0.05$) by LSD test.

Time	Treatments	SWC (%)	pH (unit)	AP (mg/kg)	NO3- (mg/kg)	NH4+ (mg/kg)	TN (g/kg)	TP (g/kg)	SOC (g/kg)	C:N	C:P	N:P
Feb	CK	29.2±2.32a	4.7±0.14a	13.5±0.67c	3.7±0.42c	15.0±1.83a	3.5±0.93a	0.19±0.04c	31.0±5.46a	9.2±1.75a	175.7±72.81a	19.8±8.27a
	UR	24.4±2.42c	4.9±0.25a	18.6±1.72a	5.1±0.39b	21.9±0.35d	3.8±0.19a	0.18±0.03d	34.8±7.49a	9.3±2.43a	208.0±67.47a	22.3±3.48a
	Th	27.4±1.25b	4.5±0.20a	13.2±1.32d	6.1±0.19a	26.7±3.93c	2.9±0.21a	0.24±0.04b	31.3±4.71a	10.8±2.03a	136.1±39.97a	12.8±3.83a
	TUR	18.4±1.79d	4.5±0.10a	18.4±1.48d	6.3±1.73a	31.5±3.98b	4.1±0.26a	0.36±0.03a	34.3±4.97a	8.4±1.22a	96.0±14.45a	11.5±1.64a
	Average	24.9±4.10B	4.7±0.17A	15.9±2.58B	5.0±0.85C	23.8±6.10B	3.6±0.44C	0.24±0.07B	32.9±1.71B	9.4±0.86B	154.1±42.04A	16.6±4.56A
May	CK	41.9±0.46a	4.9±0.01a	14.3±1.39d	7.8±0.92c	31.1±3.71c	4.5±0.19d	0.57±0.08b	31.6±6.37a	7.0±1.58a	57.4±17.64a	8.1±1.10c
	UR	39.7±3.13a	5.0±0.13a	28.0±0.39a	7.1±1.00d	24.2±2.97d	4.6±0.08c	0.49±0.06d	31.7±7.93a	7.0±1.85a	67.2±24.40a	9.4±1.06b
	Th	42.2±2.11a	4.7±0.23a	17.4±3.09c	10.6±1.42a	43.0±2.74a	5.2±0.22b	0.67±0.01a	33.1±4.47a	6.5±1.10a	45.1±8.71a	7.0±0.75d
	TUR	39.8±0.62a	4.6±0.19a	19.0±2.53b	8.2±0.71b	33.6±2.78b	6.2±0.21a	0.55±0.09c	34.6±4.07a	5.6±0.84a	65.0±12.27a	11.5±1.52a
	Average	40.9±1.16A	4.8±0.16A	20.0±5.51A	7.9±1.65A	33.0±6.73A	5.1±0.68B	0.57±0.06A	32.8±1.22B	6.5±0.57C	58.7±8.64C	9.0±1.67C
Aug	CK	32.5±1.47a	5.4±0.08a	5.1±0.20a	7.3±0.42a	8.0±0.80c	4.6±0.39d	0.48±0.04a	48.4±4.12d	13.0±2.88a	102.5±16.55a	8.3±1.97d
	UR	25.2±0.74d	4.60±0.02b	5.9±0.57a	6.9±0.67b	4.7±1.12d	5.1±0.44c	0.42±0.05a	54.8±2.79b	12.6±3.21a	133.0±13.65a	11.4±3.40b
	Th	30.8±1.39b	4.5±0.05c	3.9±2.07a	7.3±0.46a	15.6±0.84a	6.4±0.33b	0.53±0.12a	54.7±6.01c	11.6±3.85a	111.0±33.85a	9.7±1.22c
	TUR	27.2±2.75c	4.50±0.06d	4.3±0.98a	7.8±1.02a	15.5±1.88b	8.3±0.40a	0.47±0.06a	65.2±2.31a	9.5±1.42a	140.0±14.29a	15.1±2.85a
	Average	28.9±2.88B	4.75±0.38A	5.0±0.50C	7.3±0.33B	11.0±4.75C	6.1±1.43A	0.48±0.04A	55.8±6.03A	11.7±1.36A	121.6±15.38B	11.1±2.54B

For comparisons of soil properties average across sampling time, average means in the bottom rows followed by different upper case letter are significantly different ($P < 0.05$). Th, thinning; UR, understory removal; Th × UR, interactions between thinning and understory removal.

Table S2. Statistical significance and variance explained by the variables selected according to the redundancy analysis (RDA). The statistical significance was determined at $p \leq 0.05$.

Variables	<i>P</i>	Variance explained
NH ₄ ⁺ -N	0.002	55%
NO ₃ -N	0.03	57%
SWC	0.04	52%
pH	0.05	60%