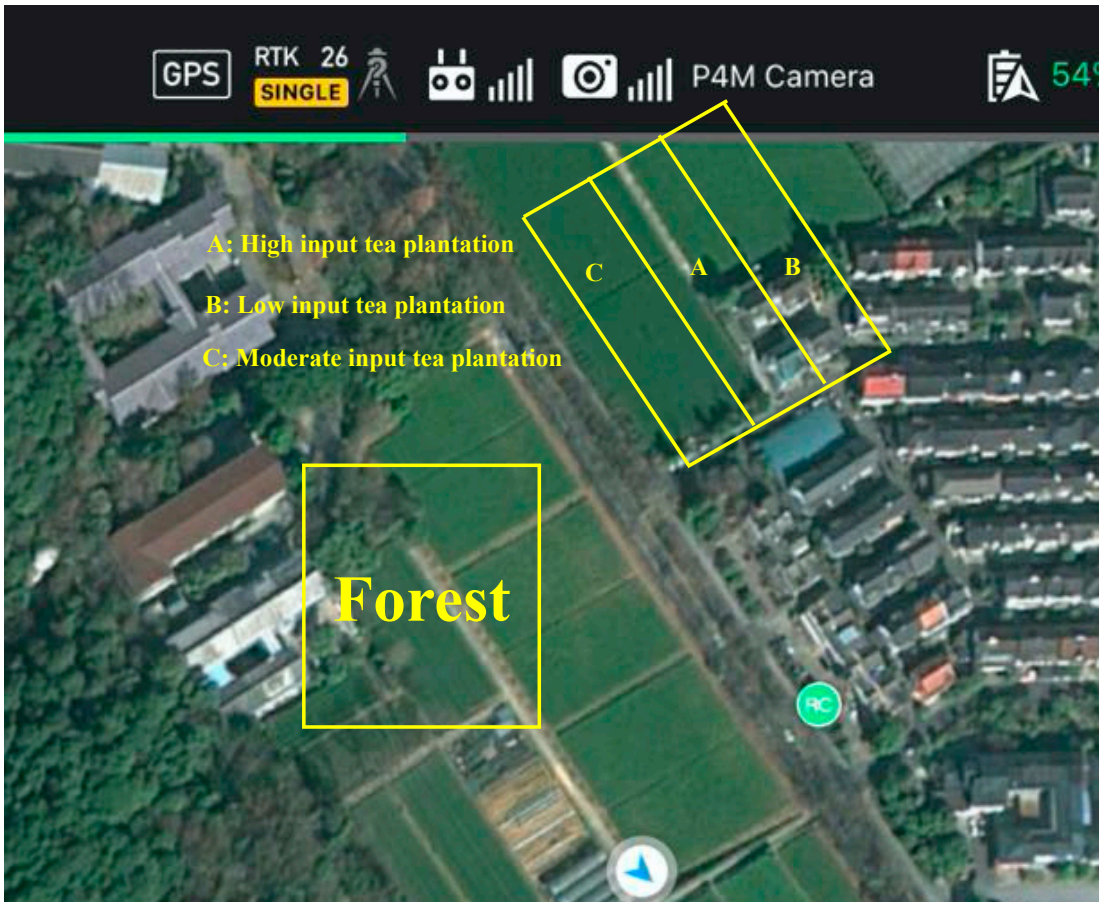

Figure S1. The location (120°10′E, 30°10′N) and plot set up for tea gardens with low-, medium-, high-input levels, and the adjacent forest.

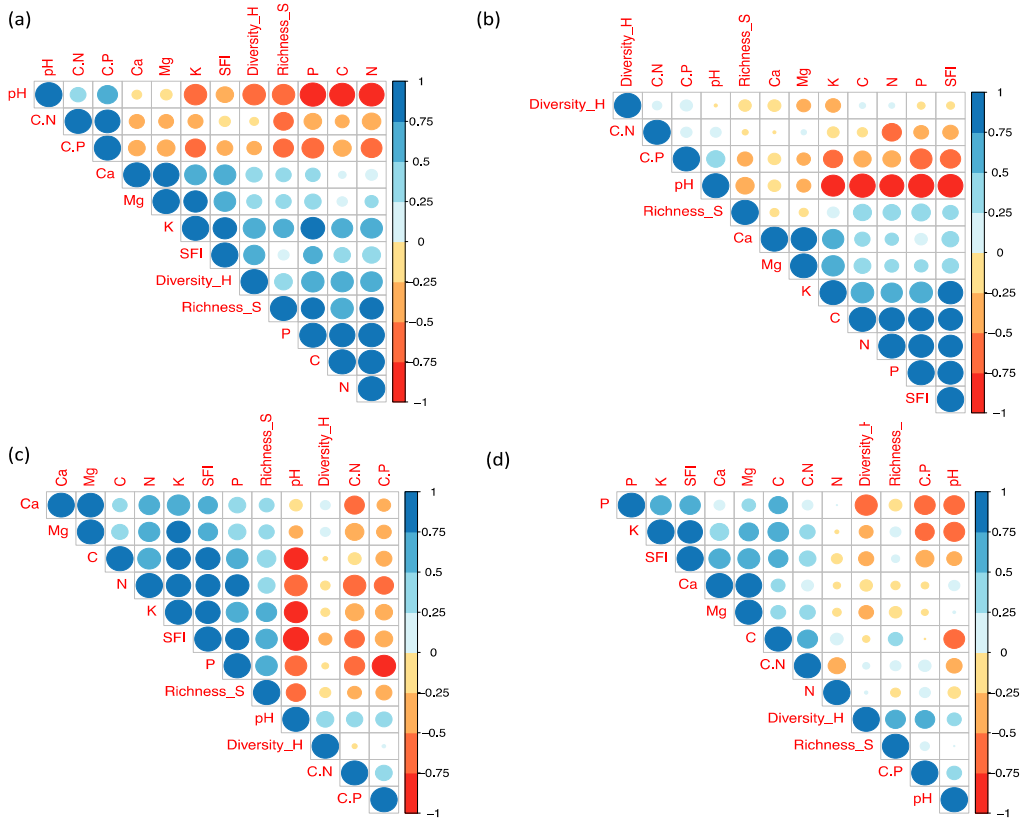

Figure S2. Correlations between soil properties and fungal diversity along the tea soil layers (a) 0-10 cm (b) 10-20 cm (c) 20-40 cm (d) 40-60 cm under fertilizer inputs.

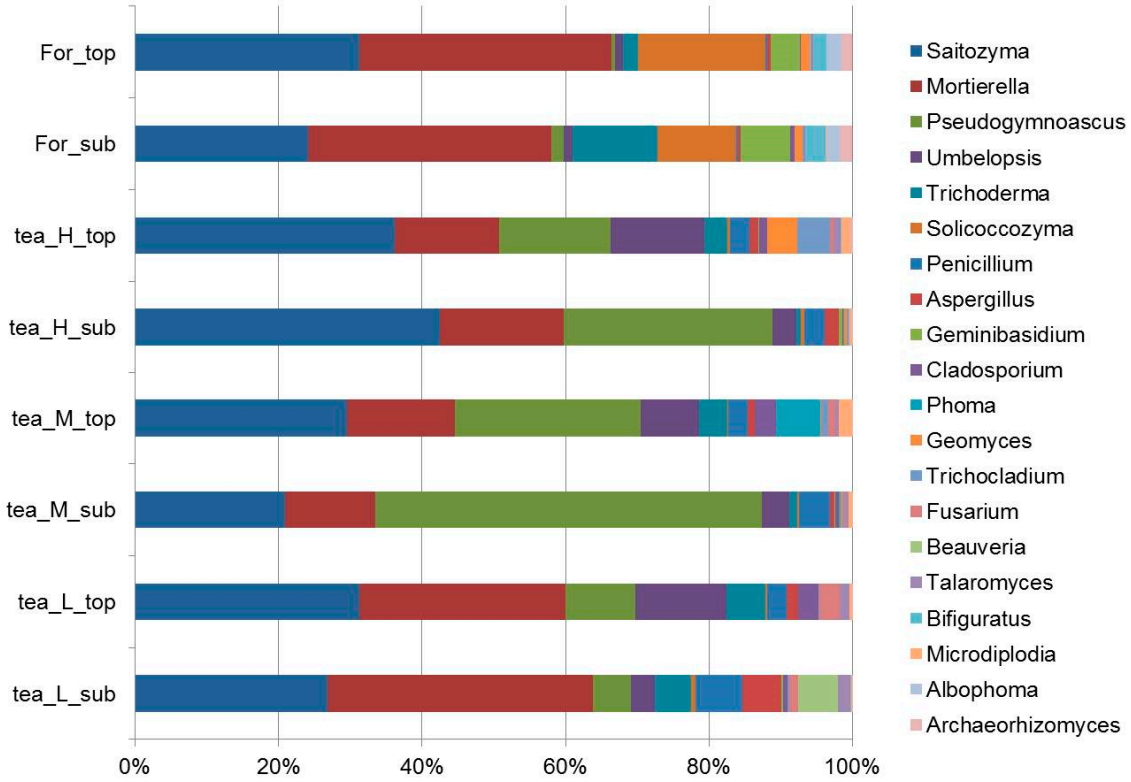

Figure S3. The relative abundances of top 20 abundant fungal genus and heatmap analysis of fungal composition. For: forest; L: low fertility tea garden; M: Middle fertility tea garden; H: High fertility tea garden; top: topsoil (0-20 cm); sub: subsoil (20-60 cm).

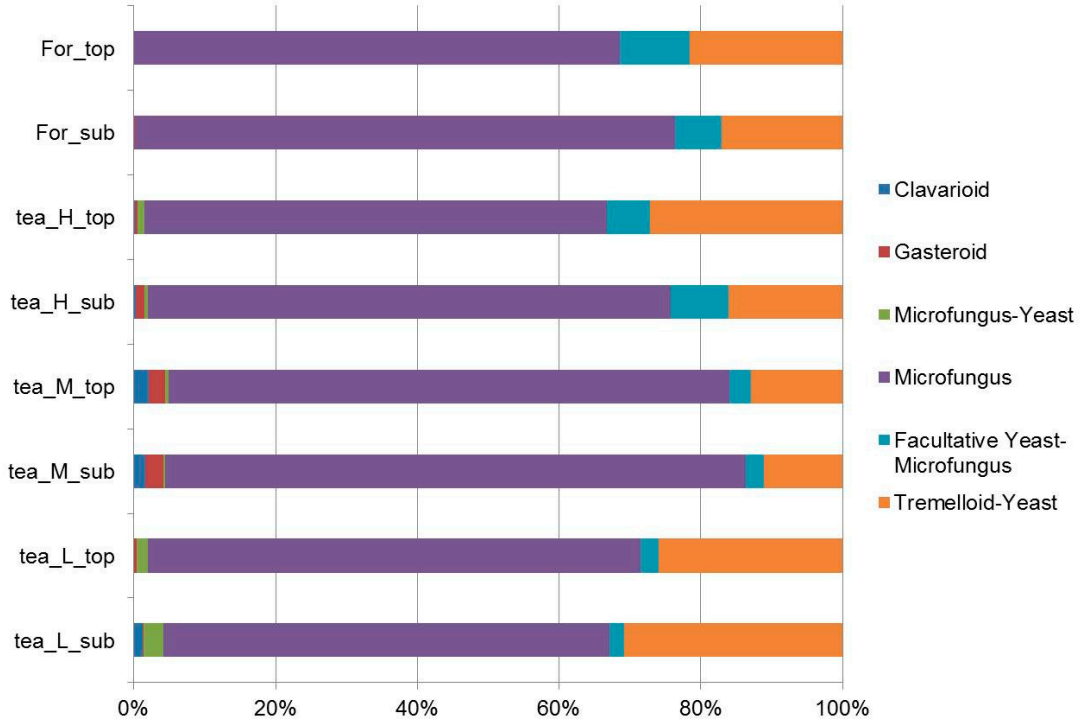

Figure S4. fungal traits in tea garden in different soil layers under high, low and middle fertilizer inputs. For: forest; L: low fertility tea garden; M: Middle fertility tea garden; H: High fertility tea garden; top: topsoil (0-20 cm); sub: subsoil (20-60 cm).

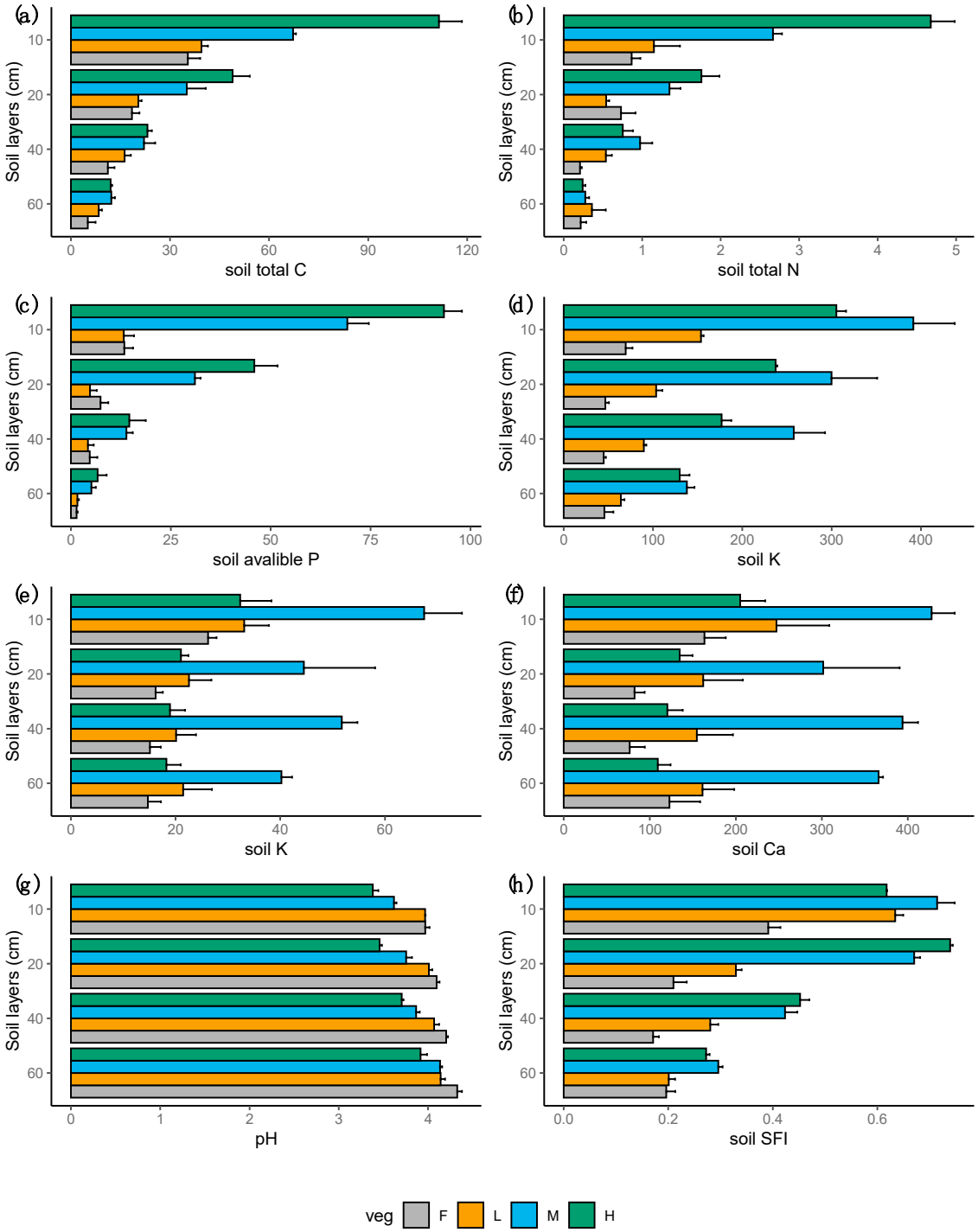

Figure S5. Changes of soil properties along soil profiles in studying sites. veg: vegetation types. F: forest; L: low fertility tea garden; M: Middle fertility tea garden; H: High fertility tea garden.

Table S1. All physicochemical properties and the soil fertility index of tea gardens and forest in the 0−10, 10-20, 20-40 and 40−60 cm soil depth (mean ± standard error).

Soil depth	Treatment	pH	TN (g kg^{-1})	SOC (g kg^{-1})	NO_3^- (mg kg^{-1})	NH_4^+ (mg kg^{-1})	AP (mg kg^{-1})	AK (mg kg^{-1})	SFI
0-10cm	Forest	3.97±0.10	0.86±0.05	22.4±1.7	19.7±2.6	16.9±4.3	11.1±1.6	69.4±15.4	0.634±0.031
	Low-input	3.97±0.01	1.40±0.30	22.7±1.2	85.3±5.6	19.4±1.0	15.8±1.1	153.8±5.7	0.748±0.001
	Moderate-input	3.62±0.05	2.67±0.22	38.6±1.0	380.0±18.1	49.1±2.0	69.2±10.8	305.2±21.9	0.743±0.002
	High-input	3.38±0.12	4.68±0.61	64.0±7.9	542.6±65.6	56.7±3.5	93.4±9.0	341.6±9.9	0.210±0.050
10-20cm	Forest	4.10±0.07	0.72±0.02	11.8±1.4	15.0±2.5	16.0±3.7	7.4±1.2	46.7±7.7	0.329±0.022
	Low-input	4.01±0.08	0.54±0.08	11.7±1.1	46.6±2.7	14.6±2.7	9.3±0.3	103.4±14.3	0.671±0.023
	Moderate-input	3.75±0.14	1.19±0.07	20.1±2.7	311.2±50.9	39.4±4.2	31.1±2.8	237.3±3.7	0.739±0.010
	High-input	3.46±0.05	1.75±0.19	28.1±5.9	430.0±71.4	39.4±6.0	45.9±5.0	224.8±27.3	0.171±0.022
20-40cm	Forest	4.20±0.04	0.18±0.03	7.4±0.8	15.2±2.6	17.3±3.7	3.0±0.5	44.8±4.9	0.280±0.031
	Low-input	4.07±0.11	0.56±0.13	9.4±2.1	38.4±3.3	12.1±1.8	7.8±0.6	89.8±5.6	0.423±0.047
	Moderate-input	3.87±0.08	0.72±0.07	13.9±2.0	207.5±20.4	26.2±5.3	12.4±0.6	176.8±21.6	0.452±0.036
	High-input	3.71±0.04	0.85±0.06	13.3±1.5	281.3±14.4	28.5±2.2	19.1±1.5	232.5±28.8	0.196±0.034
40-60cm	Forest	4.33±0.10	0.16±0.02	3.7±0.5	16.2±2.5	10.1±2.7	1.0±0.1	33.2±4.0	0.201±0.024
	Low-input	4.14±0.10	0.20±0.03	4.8±1.1	34.3±3.2	9.5±1.1	1.6±0.1	64.0±8.1	0.296±0.016
	Moderate-input	4.13±0.05	0.27±0.03	6.5±0.3	90.6±6.5	16.2±2.0	5.1±0.8	129.9±21.8	0.273±0.013
	High-input	3.92±0.15	0.28±0.05	6.9±0.5	269.9±41.1	27.7±4.4	9.7±1.8	138.0±17.1	0.634±0.031

TN, total nitrogen, SOC, soil organic carbon; NO_3^-, nitrate; NH_4^+, ammonium; AP, available Phosphorus; AK, available potassium; SFI, soil fertility index.