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Supporting Information for

Peatland degradation increased biodiversity and polyphenols accumulation

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Introduction

The support information provides the same charts and tables as in this article, as well as the data to generate the charts.

Aboveground and underground biomass data

Peatland type	Aboveground biomass(g/m2)	Underground biomass(g/m2)
alpine meadow	834.12	3100.11
alpine meadow	510.72	3442.70
alpine meadow	845.08	3798.57
alpine meadow	581.08	3230.28
alpine meadow	598.63	3355.89
alpine meadow	525.67	3621.10
swamp meadow	482.13	3334.26
swamp meadow	482.21	5873.43
swamp meadow	397.22	4148.86
swamp meadow	321.33	4635.03
swamp meadow	300.5	4211.04
swamp meadow	369.46	5186.13
peat swamp	175.36	1388.83
peat swamp	294.42	1944.46
peat swamp	251.44	1989.19
peat swamp	78.56	391.35
peat swamp	75.11	325.93
peat swamp	47.1	365.36

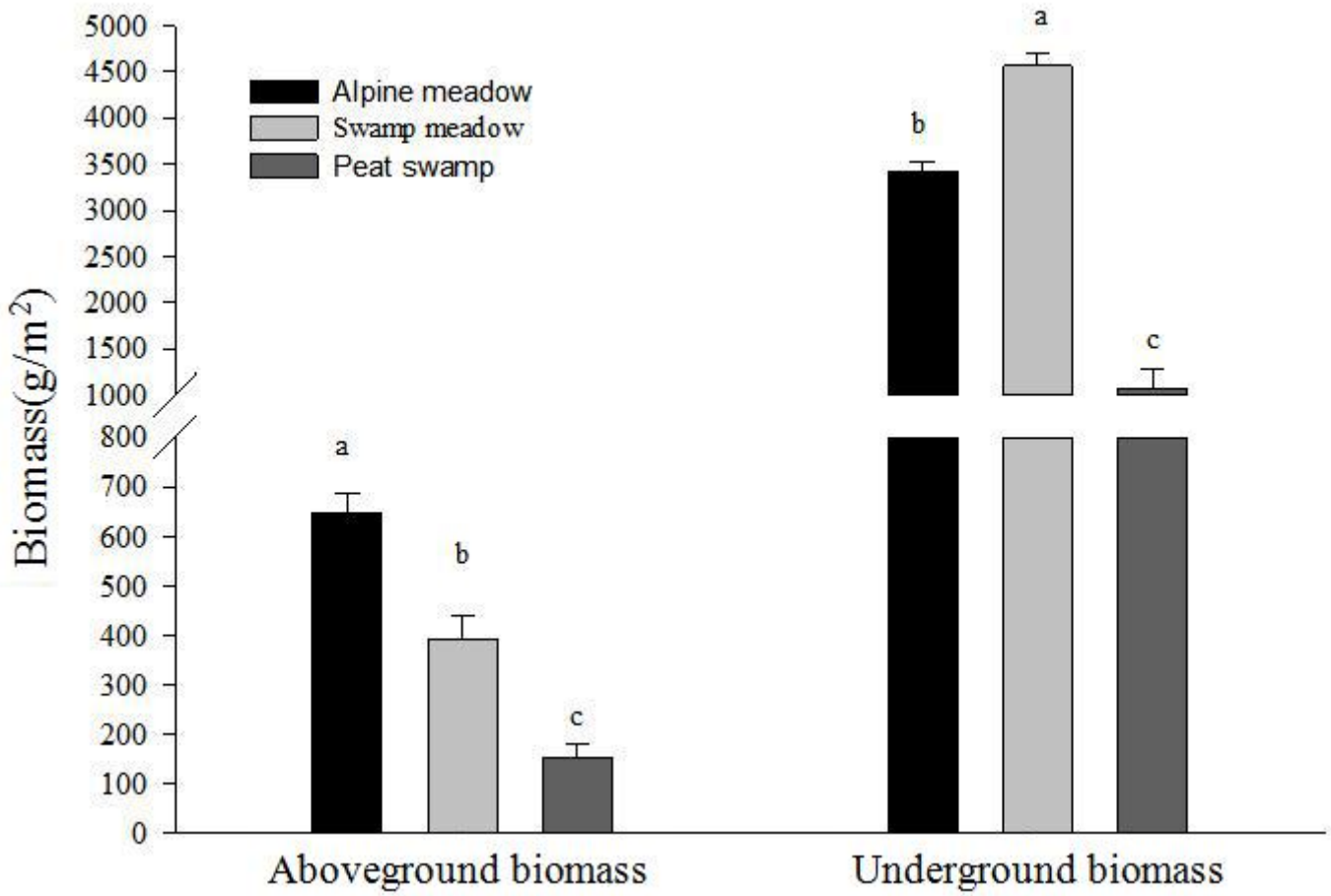

Fig 1 Changes in aboveground and belowground biomass in different stages of peatland degradation (Different letters indicate significant differences, P<0.05)

Content distribution of 9 phenolic acids in different soil layers of alpine meadow and marsh meadow

	swamp meadow		
	The soil 0-10cm	The soil 10-20cm	The soil 20-30cm
GA(μg/g)	6.649750202	4.113475526	3.279380648
PH(μg/g)	0.299944725	0.128648711	0.124383877
PY(μg/g)	0.39783773	0.131024489	0.102389916
SY(μg/g)	0.412757247	0.139269639	0.108961193
SA(μg/g)	0.434170229	0.24627933	0.164607054
P(μg/g)	0.074889457	0.049944577	0.040467328
GE(μg/g)	0.038505166	0.020026068	0.031312313
CA(μg/g)	0.081791881	0.013506823	0.006278369
FE(μg/g)	0.110796558	0.04317979	0.039204826
	alpine meadow		
	The soil 0-10cm	The soil 10-20cm	The soil 20-30cm
GA(μg/g)	11.0794	6.2167	1.2427
GE(μg/g)	0.224	0.1252	0.0404
PY(μg/g)	0.225	0.1243	0.0493
PH(μg/g)	0.2465	0.1421	0.1199
P(μg/g)	0.3895	0.2205	0.1621
SY(μg/g)	0.0701	0.0357	0.0222
SA(μg/g)	0.0183	3.07E-04	0
CA(μg/g)	0.2054	0.0195	3.74E-03
FE(μg/g)	0.1075	0.0247	0.0223

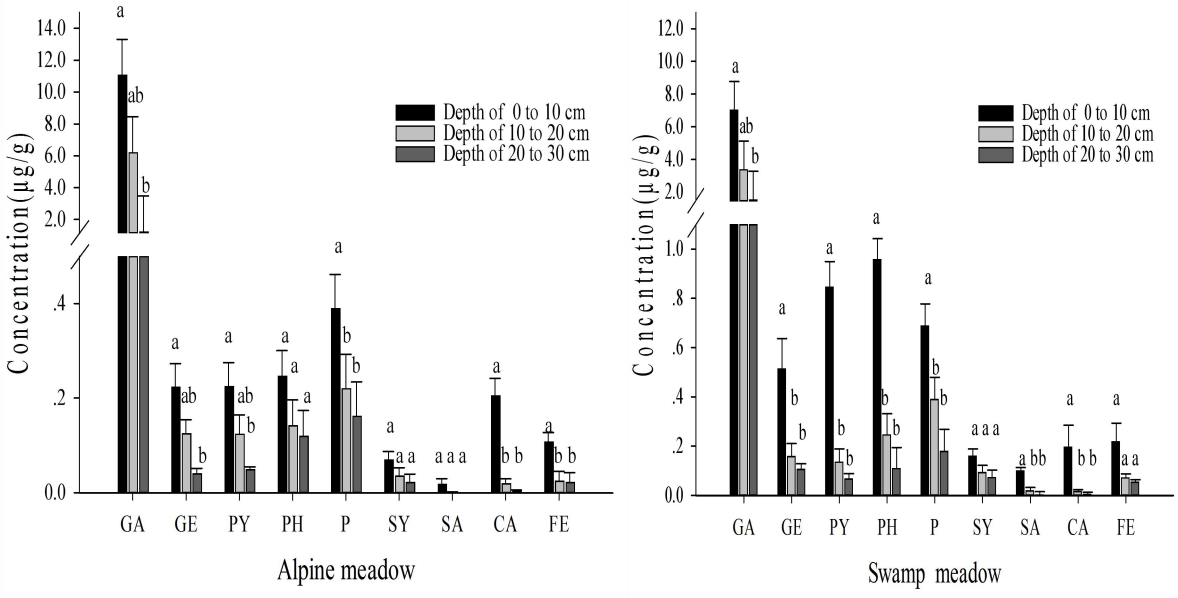

Fig 2 Nine main phenolic compounds in peatland varied with soil depth (different letters indicatesignificant difference between different soil depth, P < 0.05). **Note:** gallic acid (**GA**), gentisic acid (**GE**), catechin (**PY**), p-hydroxybenzoic acid (**PH**), 4-coumaric acid (**P**), syringic acid (**SY**), salicylic acid (**SA**), caffeic acid (**CA**), ferulic acid (**FE**).

The content of phenolic acid changes with the degradation of peatland

	alpine meadow	swamp meadow
GA(μg/g)	5.756800	3.984900
GE(μg/g)	0.140100	0.260400
PY(μg/g)	0.135100	0.350500
PH(μg/g)	0.156200	0.438600
P(μg/g)	0.262800	0.419700
SY(μg/g)	0.035500	0.109200
SA(μg/g)	0.000102	0.041400
CA(μg/g)	0.021400	0.073200
FE(μg/g)	0.045500	0.115400

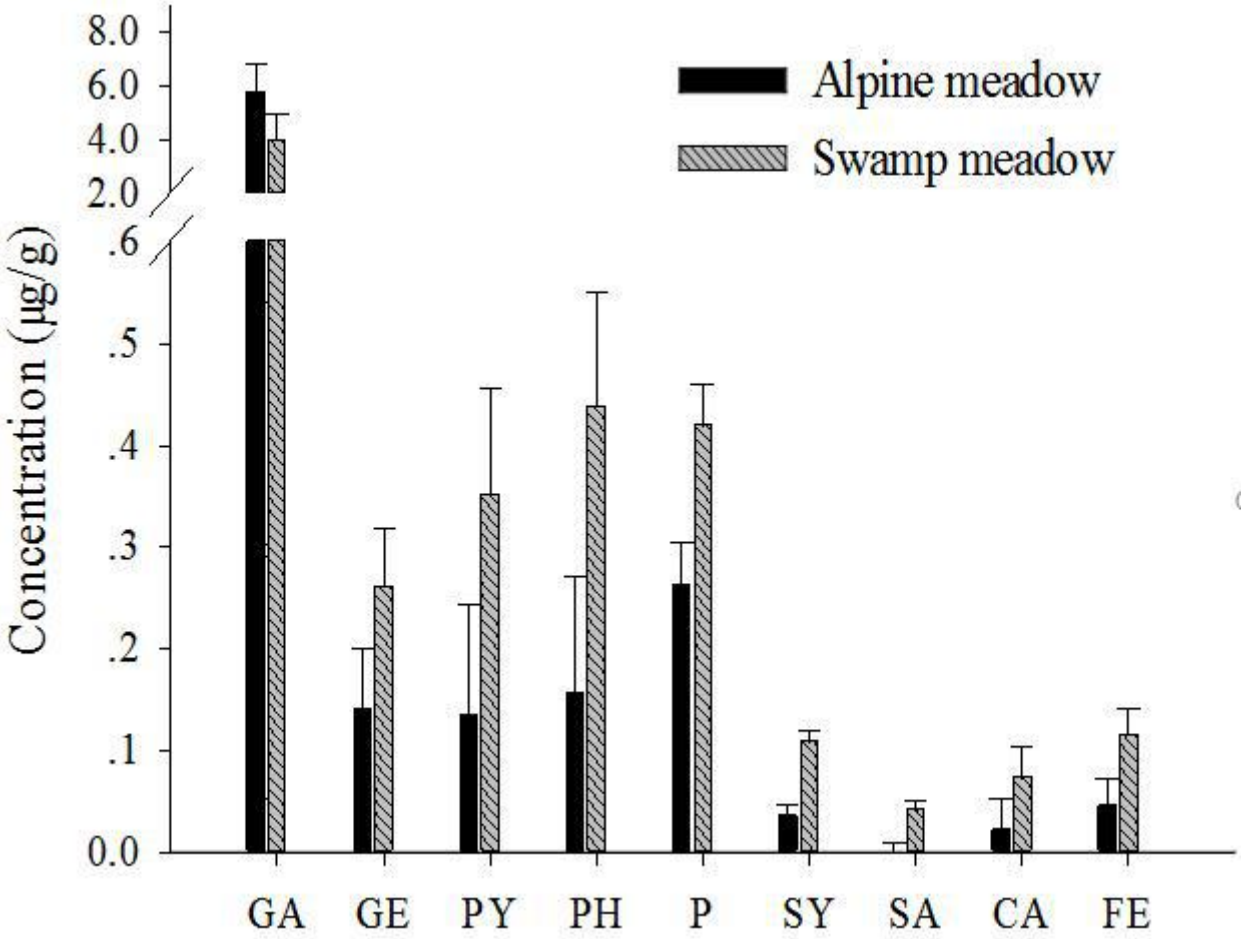

Fig 3 The concentration of nine phenolic compounds in alpine meadow and swamp meadow. **Note:** gallic acid (**GA**), gentisic acid (**GE**), catechin (**PY**), p-hydroxybenzoic acid (**PH**), 4-coumaric acid (**P**), syringic acid (**SY**), salicylic acid (**SA**), caffeic acid (**CA**), ferulic acid (**FE**).

Regression analysis data

Peatland type	Pielou evenness index	Shannon-Wiener's diversity index	Species richness index	Total coverage	Water-soluble phenols
alpine meadow	0.336	1.63	10	100	104.4
alpine meadow	0.319	1.542	9	100	93.24
alpine meadow	0.306	1.52	8	100	92.75
alpine meadow	0.291	1.493	6	100	67.32
alpine meadow	0.289	1.349	6	95	62.43
alpine meadow	0.242	1.252	6	90	39.6
swamp meadow	0.339	1.476	8	85	27.47
swamp meadow	0.315	1.39	7	85	20.42
swamp meadow	0.302	1.357	5	80	19.88
swamp meadow	0.294	1.316	5	70	17.01
swamp meadow	0.269	1.185	5	60	16.91
swamp meadow	0.22	0.86	5	60	16.82

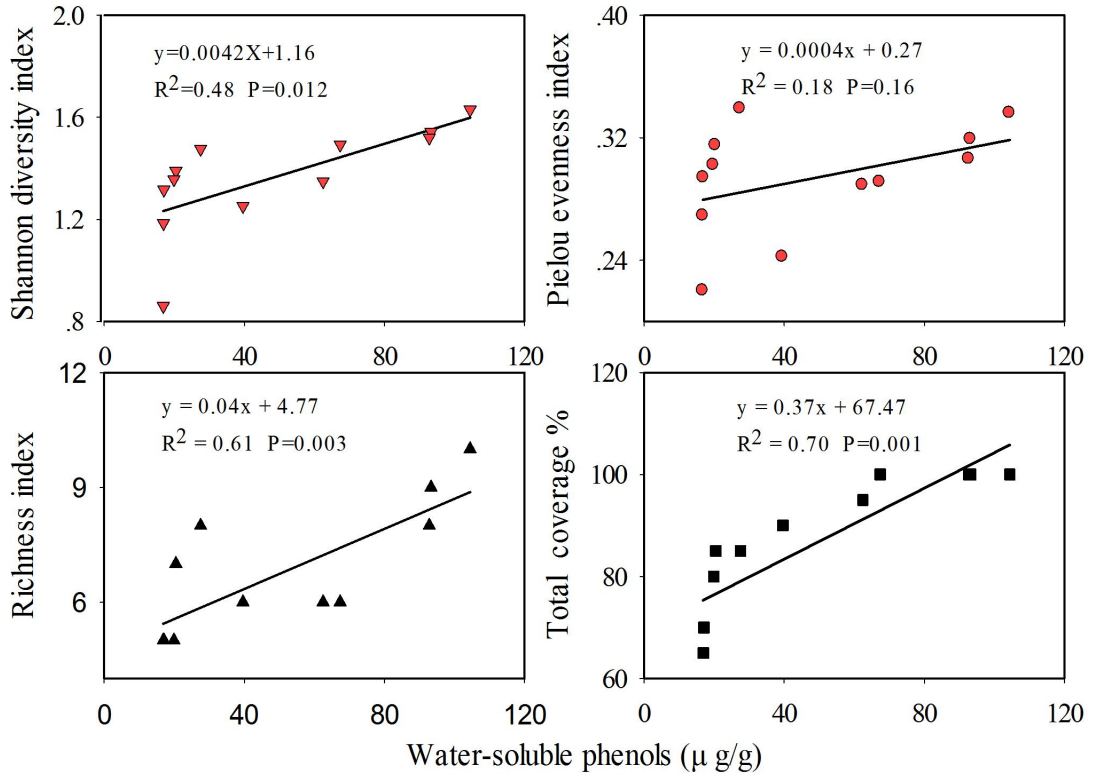

Fig 4 Regression analysis of the concentration of water-soluble phenols and vegetation coverage, diversity, richness and evenness index

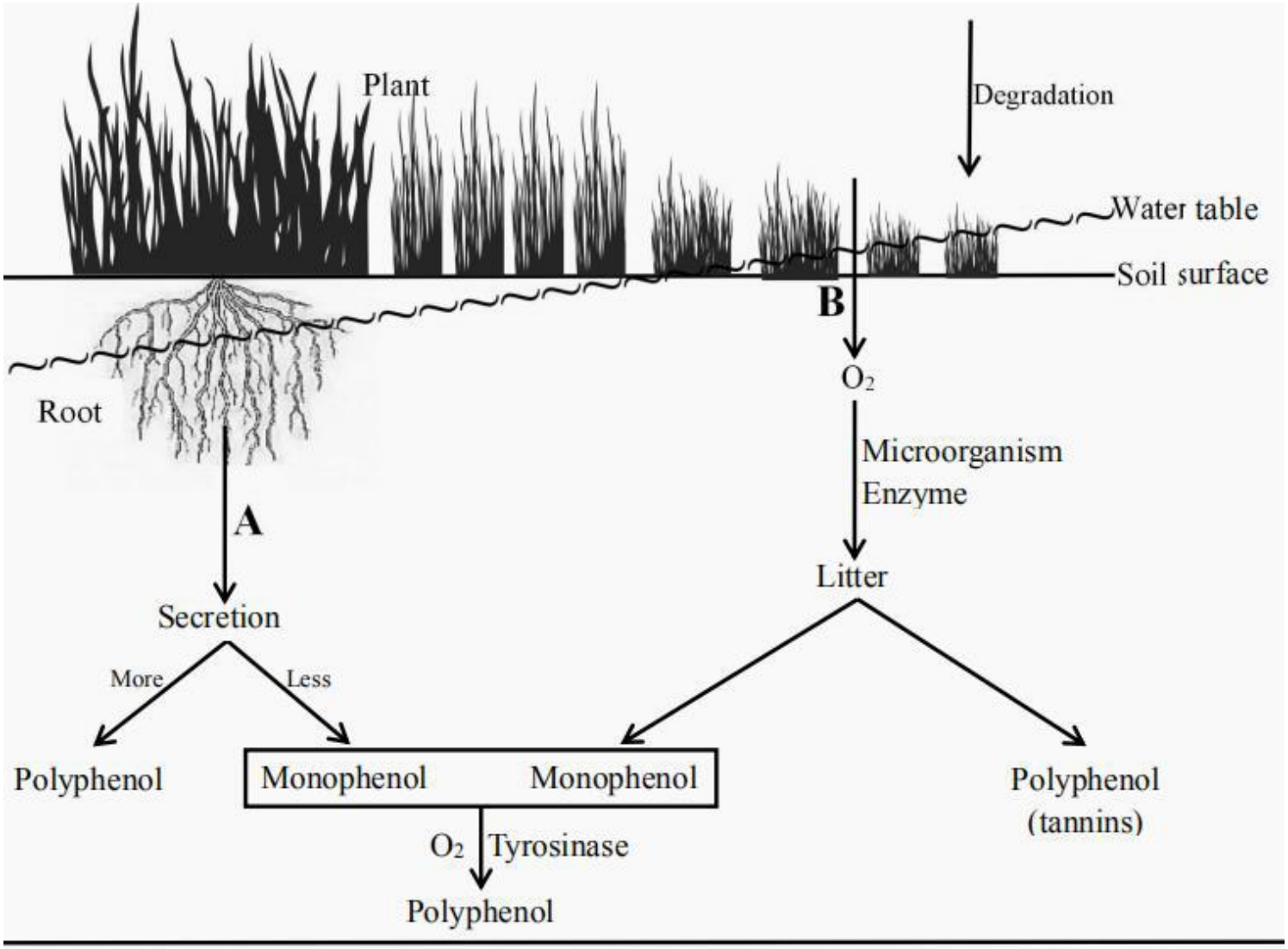
Plant
Degradation
Water table
Soil surface
B
O_2
Root
Microorganism
Enzyme
A
Litter
Secretion
More
Less
Polyphenol
Monophenol
Monophenol
Polyphenol
(tannins)
O_2
Tyrosinase
Polyphenol

Fig 5 Water level, oxygen and vegetation affect the accumulation of phenols in peatland

Note: In the process of peatland degradation, the decrease of water level leads to the increase of soil oxygen content (A), and the change of water level and oxygen content promotes the increase of vascular plants, thus increasing plant diversity (B). Root secretion and litters increased, producing a large number of water-soluble phenols(C). Water-soluble phenols are mainly polyphenols (E) and a few are monophenols (D). The oxygen-enriched environment increases the activity of microorganisms and enzymes that decompose complex phenols (F) into simple phenols or other small molecular compounds (G). Under the action of phenol oxidase, monophenol was converted into polyphenols (H), and the degradation resulted in the decrease of total phenols and the increase of polyphenols.