Table S1 Leaf element contents and stoichiometry of *S. chamaejasme* in different sample sites in this study (Mean ± SD, n = 3)

Sample Sites		Leaf								
		C（g • kg^{-1}）	N（g • kg^{-1}）	P（g • kg^{-1}）	K（g • kg^{-1}）	C:N	C:P	N:P	N:K	K:P
Inner Mongolia Plateau	GY	496.84±19.91	19.68±0.79	2.11±0.08	5.31±0.16	25.25±0.00	235.13±0.03	9.31±0.00	3.71±0.20	2.51±0.13
	DL	512.12±28.08	22.86±1.41	2.78±0.15	5.64±0.47	22.50±2.62	184.86±20.44	8.22±0.34	4.08±0.58	2.04±0.27
	TPSQ	494.48±21.19	21.09±0.37	2.43±0.10	5.70±0.73	23.46±0.74	268.51±22.23	10.49±1.07	3.75±0.56	2.35±0.37
	SU	536.20±4.56	19.13±1.19	1.57±0.15	4.15±0.34	28.10±1.68	342.78±31.91	12.18±0.43	4.65±0.61	2.66±0.41
	SGDL	530.58±3.86	22.68±1.53	2.30±0.23	5.86±0.27	23.47±1.75	232.17±23.85	9.92±1.19	3.88±0.43	2.57±0.36
	XWQ	486.49±3.51	20.52±2.33	1.40±0.04	4.72±0.08	23.94±3.05	346.97±6.95	14.66±2.00	4.35±0.51	3.37±0.09
	BYXL	451.33±3.12	15.29±0.50	1.42±0.13	5.40±0.12	29.52±0.97	318.26±33.53	10.78±0.80	2.83±0.09	3.81±0.36
	BYH	505.43±2.84	19.72±0.62	1.89±0.15	6.10±0.41	25.64±0.74	268.51±22.23	10.49±1.07	3.25±0.26	3.23±0.37
	HTXL	485.75±2.96	17.39±0.80	1.79±0.11	5.86±0.36	27.93±1.11	271.93±15.67	9.74±0.29	2.97±0.11	3.28±0.03
	FYD	479.72±9.50	21.33±4.82	2.76±0.62	6.39	22.49±7.83	173.89±60.50	7.73	3.34	2.32
Qinghai- Tibet Plateau	YD	528.45±5.46	23.48±1.64	1.74±0.14	6.64±0.41	22.58±1.66	305.60±24.77	13.60±1.73	3.55±0.34	3.83±0.13
	TZ	498.50±7.70	20.35±1.79	2.13±0.08	5.57±0.70	24.60±1.73	234.73±8.45	9.57±0.66	3.67±0.15	2.62±0.29
	HC	497.96±1.32	16.60±6.76	3.19±0.16	9.08±0.92	33.17±11.85	156.60±8.04	5.29±2.44	1.88±0.94	2.85±0.18
	SD	507.82±5.16	21.82±1.93	1.77±0.06	7.78±0.38	23.38±1.90	287.56±9.63	12.35±1.00	2.80±0.20	4.40±0.08
	SN	492.53±5.21	20.22±1.20	2.30±0.12	8.06±0.46	24.40±1.27	214.05±11.12	8.77±0.28	2.52±0.26	3.50±0.27
	MT	502.91±2.39	20.70±4.79	1.40±0.07	8.61±0.49	25.25±6.18	359.69±17.93	14.75±3.23	2.42±0.63	6.15±0.27
	QL	524.76±2.28	19.14±0.91	1.99±0.14	7.94±0.06	27.46±1.41	264.21±17.64	9.65±0.95	2.41±0.12	4.00±0.30
	GC	483.47±16.03	18.90±2.50	2.25±0.06	6.38±0.58	25.82±4.18	215.19±10.71	8.47±1.27	2.99±0.47	2.84±0.22
	HY	490.98±7.10	17.86±1.24	1.98±0.08	6.66±0.45	27.57±1.99	234.54±9.06	8.49±0.81	2.68±0.02	3.38±0.37
	GH	504.30±5.96	18.24±1.37	2.15±0.11	6.02±0.20	27.75±11.99	234.54±9.06	8.49±0.81	3.03±0.25	2.80±0.05
	YTL	531.11±13.35	22.87±5.43	1.56±0.11	6.92±0.09	23.98±4.77	342.41±30.76	14.89±4.63	3.31±0.81	4.46±0.27
	HK	504.30±5.96	20.93±1.47	2.66±0.07	7.65±0.38	24.18±1.69	189.86±5.43	7.87±0.40	2.74±0.19	2.88±0.09
	TD	493.22±7.25	21.29±3.23	1.48±0.11	7.39±0.59	23.55±3.73	335.27±22.54	14.51±2.83	2.89±0.46	5.01±0.21
	ZK	469.81±17.14	19.93±2.57	2.52±0.27	7.80±0.49	23.79±2.58	188.10±26.72	7.99±1.68	2.57±0.46	3.10±0.14
	HN	529.02±5.35	21.15±2.01	2.95±0.24	8.10±0.38	25.15±2.15	180.40±16.35	7.20±0.81	2.61±0.12	2.76±0.25
	LQ	472.52±10.22	16.08±0.50	1.93±0.10	6.11±0.46	29.42±1.57	245.32±13.68	8.35±0.54	2.64±0.16	3.17±01.6
	REG	516.58±5.43	22.23±0.54	2.87±0.28	6.47±0.19	23.25±0.64	181.49±18.58	7.80±0.68	3.44±0.02	2.27±0.19
	TK	466.90±32.38	18.42±1.16	2.09±0.21	6.35±0.14	25.37±1.42	223.94±13.30	8.83±0.40	2.90±0.23	3.06±0.38
	HZ	465.01±16.53	18.67±2.69	3.01±0.22	5.98±0.51	25.36±4.74	154.99±10.23	6.26±1.34	3.15±0.65	1.99±0.08

Table S2 Soil physiochemical properties in different sample sites in this study (Mean ± SD, n = 3, n_{FYD} =1)

Sample Sites		Soil								
		C（g • kg^{-1}）	N（g • kg^{-1}）	P（g • kg^{-1}）	K（g • kg^{-1}）	C:N	C:P	N:P	N:K	K:P
Inner Mongolia Plateau	GY	74.86±1.22	5.56±0.30	0.75±0.02	14.37±1.40	12.61±0.89	95.60±3.80	7.58±0.24	0.37±0.03	20.72±1.52
	DL	60.57±4.68	4.46±0.31	0.63±0.01	22.84±0.30	13.60±0.91	97.01±9.47	7.14±0.65	0.20±0.02	36.53±0.40
	TPSQ	29.57±3.98	2.93±0.57	0.41±0.035	22.50±1.57	10.17±0.75	72.77±5.44	7.18±0.79	0.13±0.03	55.92±8.23
	SU	13.57±6.42	1.42±0.33	0.30±0.03	19.36±0.22	9.20±2.11	44.23±16.64	4.71±0.65	0.07±0.02	64.88±5.39
	SGDL	53.15±16.62	4.50±1.42	0.54±0.02	18.30±1.03	11.82±1.03	99.35±30.87	8.39±2.55	0.24±0.07	34.21±2.70
	XWQ	5.87±1.55	0.76±0.13	0.21±0.02	0.95±0.68	7.72±1.41	29.15±7.78	3.74±0.40	1.05±0.54	4.54±2.85
	BYXL	84.74±0.89	5.26±0.15	0.78±0.09	19.97±1.58	16.26±0.35	98.28±11.26	6.05±0.70	0.24±0.02	25.05±1.08
	BYH	13.80±0.85	1.5±0.08	0.34±0.03	18.69±0.71	9.20±0.21	40.61±2.52	4.41±0.18	0.08±0.00	55.02±3.14
	HTXL	27.29±0.659	2.72±0.091	0.35±0.02	19.30±0.54	9.96±0.10	81.14±3.76	8.15±0.38	0.15±0.01	54.31±2.35
	FYD	49.64	4.96	0.66	24.60	9.97	75.06	7.53	0.20	37.33
Qinghai- Tibet Plateau	YD	53.88±4.59	0.58±0.03	0.58 ±0.03	25.70± 2.38	11.31±1.90	93.56±7.92	8.49±2.10	0.19±0.05	44.53±1.90
	TZ	67.00±3.18	5.05±0.05	0.67 ±0.06	29.47 ±1.52	13.32±0.77	99.91±5.71	7.50±0.15	0.17±0.02	36.88±1.53
	HC	38.07±7.03	3.02±0.88	0.56 ±0.04	17.59 ±0.63	12.88±1.40	67.73±7.62	5.34±1.18	0.17±0.05	31.55±1.63
	SD	50.48±8.36	3.47±0.91	0.55 ±0.05	17.37 ±0.29	14.84±2.27	92.19±17.81	6.29±1.55	0.20±0.05	31.65±2.64
	SN	66.17±17.91	5.02±2.71	0.60 ±0.06	25.17 ±2.35	14.61±5.12	109.17±22.77	8.31±4.20	0.21±0.13	42.16±5.87
	MT	30.90±0.43	3.38±0.02	0.64 ±0.02	19.78 ±0.90	9.13±0.17	48.05±2.27	5.26±0.15	0.17±0.01	30.76±1.74
	QL	75.00±5.43	7.43±0.78	0.71 ±0.01	29.52 ±3.37	10.18±1.31	106.00±8.40	10.5±1.22	0.25±0.00	41.75±5.22
	GC	51.69±1.28	3.37±0.41	0.66 ±0.02	24.81 ±1.17	15.49±1.96	78.72±1.39	5.13±0.62	0.14±0.02	37.76±0.67
	HY	12.59±1.54	0.40±0.26	0.20 ±0.03	16.61 ±0.45	38.90±16.62	64.06±9.57	2.04±1.40	0.02±0.02	85.39±16.20
	GH	45.32±5.57	3.73±0.49	0.58 ±0.01	23.04 ±1.74	12.16±0.10	78.70±10.60	6.48±0.92	0.16±0.02	40.00±3.50
	YTL	9.82 ±2.51	0.24±0.13	0.40 ±0.05	20.74 ±0.04	45.21±11.73	24.87±8.20	0.61±0.39	0.01±0.01	52.13±6.41
	HK	74.42 ±8.91	5.60±0.96	0.57 ±0.04	26.12 ±5.75	13.38±1.17	130.24±16.69	9.77±1.42	0.22±0.07	45.48±8.34
	TD	35.87 ±6.64	3.34±0.78	0.58 ±0.04	14.86 ±1.14	10.82±0.77	62.01±15.29	5.79±1.76	0.22±0.05	25.52±2.67
	ZK	62.19 ±9.82	5.16±0.93	0.60 ±0.05	17.21 ±0.58	12.10±1.10	104.79±19.35	8.65±1.39	0.30±0.06	29.01±3.48
	HN	64.25 ±10.06	5.29±0.21	0.73 ±0.11	16.58 ±1.63	12.14±1.62	89.07±19.05	7.31±0.99	0.32±0.02	22.75±1.43
	LQ	53.95 ±7.05	4.58±0.36	0.72 ±0.03	26.40 ±0.25	11.76±0.60	75.40±10.66	6.40±0.61	0.17±0.02	36.88±1.53
	REG	38.43 ±7.74	3.57±1.13	0.82 ±0.12	30.55 ±0.99	11.09±1.60	48.08±13.94	4.50±1.73	0.12±0.03	37.89±6.11
	TK	44.14 ±14.63	3.48±0.92	0.72 ±0.04	22.75 ±0.88	12.54±0.83	61.89±21.63	4.88±1.36	0.15±0.05	31.85±2.10
	HZ	50.20 ±14.92	3.66±0.61	0.64 ±0.06	18.03 ±0.93	13.52±2.18	79.90±29.31	5.5±1.38	0.20±0.03	28.23±2.75

Sample Sites		Soil						
		AP (mg • kg^{-1})	AK (mg • kg^{-1})	AN (mg • kg^{-1})	NN (mg • kg^{-1})	WC	pH	Ec (μs • cm^{-1})
Inner Mongolia Plateau	GY	6.62±2.26	97±18.36	12.03±0.73	9.93±0.36	0.21±0.02	8.40±0.31	813±172.53
	DL	3.97±2.59	179.67±79.22	12.49±3.70	20.13±7.26	0.20±0.01	8.46±0.049	587.67±170.53
	TPSQ	4.62±1.75	225.67±86.59	29.13±3.70	5.66±1.57	0.07±0.01	7.52±0.32	83±20.95
	SU	2.50±1.13	86.67±37.07	9.37±0.77	6.37±1.55	0.05±0.00	7.68±0.047	87±45.13
	SGDL	6.93±1.23	84.33±40.61	14.13±2.83	12.81±3.22	0.19±0.03	7.94±0.09	714.67±219.54
	XWQ	2.36±0.08	109.67±15.26	12.33±1.51	4.32±0.28	0.04±0.01	8.03±0.32	48.33±11.93
	BYXL	5.30±1.72	279.67±260.93	34.33±13.223	83.35±35.44	0.14	7.64±0.29	874.5±30.41
	BYH	2.54±1.42	155.67±24.01	21.04±1.31	3.13±0.90	0.05±0.00	6.923±0.06	40±6.56
	HTXL	2.81±0.24	240±36.7	28.73±3.64	6.14±1.83	0.19	6.85±0.17	117.07±14.67
	FYD	4.85	286.00	20.28	11.65	0.20	6.86	118.60
Qinghai- Tibet Plateau	YD	6.75 ±1.38	89.33±49.41	42.43±2.25	10.42±3.12	0.26 ±0.04	7.81 ±0.22	195.00±36.76
	TZ	4.85 ±2.84	118.00±67.56	13.49±5.25	16.75±3.54	0.28±0.01	8.26 ±0.09	425.33±254.03
	HC	6.75±1.08	222.33±102.05	21.45±4.00	14.41±2.60	0.18±0.03	8.15±0.08	178.67±4.73
	SD	5.03 ±1.04	179.67±29.02	13.74±1.88	10.79±1.77	0.16 ±0.02	8.32±0.05	192.00±10.82
	SN	7.61±3.47	137.51±39.85	14.74±2.29	13.41±1.67	0.24 ±0.01	8.33 ±0.04	207.00 ±30.32
	MT	5.94 ±1.89	367.33±51.23	24.77±18.46	22.03±3.60	0.20±0.01	7.81 ±0.12	205.33±21.03
	QL	7.70±2.19	369.33±26.10	21.02±0.45	18.35±2.83	0.35 ±0.02	7.92 ±0.11	243.00 ±30.05
	GC	6.62 ±1.51	407.33±16.50	16.75±5.52	14.95 ±0.60	0.18 ±0.01	8.22 ±0.18	191.67 ±7.77
	HY	3.81±1.41	97.89±9.77	16.04±1.62	5.10 ±1.45	0.03 ±0.01	8.81 ±0.15	76.33 ±3.21
	GH	5.39 ±0.95	188.33±82.48	14.64±2.93	15.83 ±0.96	0.16±0.00	8.19±0.19	168.00±22.27
	YTL	3.04±0.83	86.67±34.02	7.64±3.05	6.01±1.02	0.06±0.02	8.30 ±0.05	128.33±4.51
	HK	6.93±0.31	63.67±11.24	25.59±2.68	12.60 ±0.92	0.31 ±0.04	8.28 ±0.09	192.67 ±13.65
	TD	2.72 ±0.90	134.00±53.70	12.02±3.74	14.57±2.13	0.17 ±0.01	8.27 ±0.15	155.67 ±26.63
	ZK	7.88±0.16	179.33±78.83	22.20±0.78	12.89 ±4.41	0.24 ±0.00	7.87 ±0.01	226.67 ±85.91
	HN	10.42±3.43	207.67±36.14	16.34±1.97	18.19±6.42	0.23±0.03	7.90 ±0.11	213.33±13.20
	LQ	3.90±0.76	205.33±38.28	20.83±5.02	13.22±4.73	0.26±0.02	7.98±0.05	184.00±10.44
	REG	4.76 ±0.55	196.67±98.90	12.34±4.60	11.35±1.88	0.23 ±0.01	7.89 ±0.11	202.00±21.63
	TK	4.71±1.47	42.33±23.16	18.95±0.96	5.96 ±0.47	0.23±0.02	6.82 ±0.37	56.67±2.31
	HZ	6.03 ±1.68	64.33±53.14	27.01±6.09	9.18 ±4.73	0.21 ±0.01	7.75±0.06	243.67±37.07

Table S3 Relationship between *S. chamaejasme* leaf stoichiometry and soil physicochemical properties in Northern China (n = 29 sites, Pearson correlations). Significant correlation is indicated by an * ($P < 0.05$).

	Leaf C	Leaf N	Leaf P	Leaf K	Leaf C:N	Leaf C:P	Leaf N:P	Leaf N:K	Leaf K:P
Soil C	-18.27%	-7.46%	32.91%	20.65%	1.23%	-41.00%*	-41.43%*	-27.93%	-17.84%
Soil N	-6.84%	1.42%	33.63%	26.88%	-4.55%	-39.55%*	-38.01%*	-27.44%	-13.48%
Soil P	-18.04%	-3.07%	36.04%	26.50%	-3.62%	-39.05%*	-36.92%*	-32.17%	-8.86%
Soil K	13.94%	5.49%	27.48%	15.60%	1.58%	-33.14%	-34.12%	-19.02%	-15.60%
Soil C:N	10.00%	4.64%	-13.27%	8.04%	1.07%	14.15%	14.61%	-11.04%	16.98%
Soil C:P	-13.02%	-5.35%	32.08%	19.49%	0.80%	-42.41%*	-42.71%*	-24.97%	-21.84%
Soil N:P	0.23%	5.78%	27.21%	17.50%	-7.05%	-33.68%	-31.76%	-13.87%	-17.57%
Soil N:K	-17.30%	5.85	-8.91	-15.10	-16.77%	10.75%	16.44%	22.52%	-2.85%
Soil K:P	26.18%	-6.47	-8.05	-10.24	20.41%	3.87%	-4.88%	3.85%	-6.53%
Soil available P	10.11%	7.57%	51.31%*	55.79%*	-5.44%	-49.76%*	-45.28%*	-45.84%*	-10.60%
Soil available K	-12.79%	-23.16%	-0.63%	29.47%	22.58%	-0.24%	-8.26%	-38.57%*	24.78%
Soil ammonium N	-31.40%	-22.06%	-0.05%	11.19%	14.48%	-4.38%	-8.64%	-27.29%	9.09%
Soil nitrate N	-33.42%	-36.38%	-16.41%	-1.30%	32.67%	14.55%	1.12%	-20.79%	17.82%
Soil WC	-2.70%	4.86%	36.81%*	40.87%*	-7.27%	-40.77%*	-36.55%	-38.40%*	-5.66%
Soil pH	24.92%	16.07%	2.61%	20.08%	-6.21%	1.89%	6.34%	-6.51%	11.16%
Soil Ec	-6.50%	-2.94%	3.03%	-23.17%	3.88%	-6.12%	-9.18%	16.59%	-15.80%

Table S4 Summary of linear mixed effects model analyzing the effects of soil, MAT and MAP on variation of C, N, P, K concentrations in *S. chamaejasme* leaves, using Soil, MAP, MAT and their interaction as fixed effects. Region was taken as a random factor

Element contents	Parameter	*df*	SS	*F*-value	*P*-value	Deviation explained (%)
Leaf C	Soil	(1,21)	0.00033314	0.7422	0.3987	17.49
	MAP	(1,21)	0.00024345	0.5424	0.4696	46.46
	MAT	(1,21)	0.00030390	0.6770	0.4199	13.89
	Inter(Soil:MAP)	(1,21)	0.00054312	1.2100	0.2838	
	Inter(Soil:MAT)	(1,21)	0.00000022	0.0005	0.9827	22.16
	Inter(MAP:MAT)	(1,21)	0.00000504	0.0112	0.9166	
	Inter(Soil:MAP:MAT)	(1,21)	0.00000017	0.0004	0.9847	
Leaf N	Soil	(1,21)	0.00024636	0.0855	0.7729	6.11
	MAP	(1,21)	0.00000483	0.0017	0.9677	15.28
	MAT	(1,21)	0.00144192	0.5001	0.4872	72.62
	Inter(Soil:MAP)	(1,21)	0.00009122	0.0316	0.8605	
	Inter(Soil:MAT)	(1,21)	0.00002671	0.0093	0.9242	6.99
	Inter(MAP:MAT)	(1,21)	0.00131536	0.4562	0.5068	
	Inter(Soil:MAP:MAT)	(1,21)	0.00000554	0.0019	0.9654	
Leaf P	Soil	(1,21)	0.038602	3.7802	0.06538 .	29.95
	MAP	(1,21)	0.018317	1.7938	0.19478	36.49
	MAT	(1,21)	0.017602	1.7237	0.20339	11.53
	Inter(Soil:MAP)	(1,21)	0.010788	1.0565	0.31572	
	Inter(Soil:MAT)	(1,21)	0.000936	0.0917	0.76506	22.03
	Inter(MAP:MAT)	(1,21)	0.009449	0.9253	0.34704	
	Inter(Soil:MAP:MAT)	(1,21)	0.004360	0.4269	0.52059	
Leaf K	Soil	(1,21)	0.0078280	2.9705	0.09992 .	11.98
	MAP	(1,21)	0.0211776	8.0362	0.01023 *	24.70
	MAT	(1,21)	0.0074617	2.8315	0.10757	51.46
	Inter(Soil:MAP)	(1,21)	0.0046609	1.7687	0.19840	
	Inter(Soil:MAT)	(1,21)	0.0005863	0.2225	0.64211	11.85
	Inter(MAP:MAT)	(1,21)	0.0026013	0.9871	0.33182	
	Inter(Soil:MAP:MAT)	(1,21)	0.0009943	0.3773	0.54596	

Note: Firstly, the soil data (soil C, N, P, K, AP, AK, AN, NN, WC, pH, Ec) is processed by principal component analysis (PCA), then, the number of first axis is used as Soil parameter. Leaf C, N, P, K and climatic data (MAP and MATA) heterogeneity was log-transformed to linearized the data.

Table S5 Summary of the total effects on the leaf P and K of *S. chamaejasme* in Qinghai Tibet Plateau (QT) and Inner Mongolia Plateau (IM). Significant effect is indicated by an * ($P < 0.05$).

Leaf elements	Relationships	QT			IM		
		Direct	Indirect	Total	Direct	Indirect	Total
P	**Climate → Soil**	0.369	0	0.369	0.682*	0	0.682
	Climate → Leaf P	-0.456	0.192	-0.264	0.665	0.123	0.788
	Soil → Leaf P	0.519*	0	0.519	0.180	0	0.180
K	**Climate → Soil**	0.331	0	0.331	0.590	0	0.590
	Climate → Leaf K	-0.476*	-0.127	-0.604	0.248	0.181	0.428
	Soil → Leaf K	-0.385	0	-0.385	0.306	0	0.306

Table S6 The geographical and climatic information associated with the sample sites in this study

Sample Sites		Latitude (N)	Longitude（E）	Altitude (m)	Mean Annual Precipitation(mm)	Mean Annual temperature(℃)
Inner Mongolia Plateau	GY	41.75	115.68	1380	354.77	3.69
	DL	41.81	116.09	1440	364.97	3.71
	TPSQ	41.82	115.30	1330	346.20	3.62
	SU	42.35	116.05	1310	348.86	3.30
	SGDL	42.67	115.95	1320	330.78	3.24
	XWQ	44.52	117.39	1060	314.09	2.73
	BYXL	43.76	116.79	1270	315.13	3.57
	BYH	44.77	118.16	1130	338.60	3.07
	HTXL	43.42	116.13	1300	302.00	3.32
	FYD	41.34	115.84	1535	368.29	4.28
Qinghai- Tibet Plateau	YD	36.83	103.02	2770	397.87	2.97
	TZ	37.21	102.77	2910	409.07	1.29
	HC	38.04	101.56	2790	211.86	7.42
	SD	38.45	101.20	2590	184.31	7.24
	SN	38.80	99.68	2352	143.84	8.19
	MT	38.47	100.48	2450	172.12	7.49
	QL	38.09	100.34	2970	306.79	4.72
	GC	37.25	100.36	3230	309.93	4.54
	HY	37.16	100.54	3280	316.20	4.62
	GH	36.63	100.86	3380	324.25	4.63
	YTL	36.36	100.72	2920	326.19	4.36
	HK	36.18	100.56	2920	337.76	4.06
	TD	35.26	100.53	3080	437.63	2.67
	ZK	35.25	101.03	3480	448.18	3.00
	HN	34.56	101.90	3500	565.56	2.82
	LQ	34.63	102.44	3100	570.41	2.79
	REG	34.09	102.73	3180	581.52	2.70
	TK	33.35	102.50	3450	587.53	6.30
	HZ	34.84	103.01	3180	549.36	3.47

Table S7 Eigenvalues of the soil PCA

	Dim.1	Dim.2	Dim.3
Soil C	0.951833918	0.17592561	0.001408344
Soil N	0.948442603	-0.01691258	-0.117697961
Soil P	0.876422966	0.006796241	-0.070848591
Soil K	0.548248139	-0.361333737	-0.361518754
Soil available P	0.729714855	0.090356356	-0.214290518
Soil available K	0.348820193	-0.393338992	0.298437622
Soil ammonium N	0.3371304	-0.608668314	0.356402949
Soil nitrate N	0.542945037	0.111331856	0.753622997
Soil WC	0.843821733	-0.124203841	-0.415628277
Soil pH	0.068389758	0.794001662	-0.200996436
Soil Ec	0.568393102	0.540578085	0.453887649

Table S8 Loadings of the soil PCA

	Dim.1	Dim.2	Dim.3	Dim.4	Dim.5
Soil C	0.951833918	0.17592561	0.001408344	-0.124669386	-0.015735198
Soil N	0.948442603	-0.01691258	-0.117697961	-0.105047464	0.028368126
Soil P	0.876422966	0.006796241	-0.070848591	0.126340077	-0.190794411
Soil K	0.548248139	-0.361333737	-0.361518754	0.284590289	-0.420972227
Soil available P	0.729714855	0.090356356	-0.214290518	-0.116243049	0.537969641
Soil available K	0.348820193	-0.393338992	0.298437622	0.706365468	0.310669133
Soil ammonium N	0.3371304	-0.608668314	0.356402949	-0.425586385	0.204506267
Soil nitrate N	0.542945037	0.111331856	0.753622997	0.114755697	-0.098583496
Soil WC	0.843821733	-0.124203841	-0.415628277	-0.087398817	-0.021670303
Soil pH	0.068389758	0.794001662	-0.200996436	0.247217601	0.226739269
Soil Ec	0.568393102	0.540578085	0.453887649	-0.126697032	-0.224293954

Table S9 Site scores of the soil PCA

	Site	Region	PC1	PC2	PC3	PC4	PC5	PC6
sit1	HN		-0.72595	0.28799	0.334746	0.17289	1.63856	1.22785
sit2	YTL		1.26143	0.64481	0.252156	-0.62634	-0.68378	-0.54803
sit3	REG		-0.26035	-0.21965	0.76542	-1.05542	-1.25369	0.0943
sit4	QL		-1.33971	-0.6523	0.601135	-1.02064	0.55014	0.06746
sit5	MT		-0.14804	-0.69702	-0.633402	-1.03997	0.92273	0.11591
sit6	TD		0.46061	0.60948	0.013844	-0.24643	-0.37118	0.30562
sit7	HK		-0.70163	0.08509	0.945926	1.05185	0.08749	-1.24512
sit8	SD		0.183	0.56206	0.171867	-0.32891	0.34878	0.09953
sit9	GH		0.03596	0.22331	0.218977	-0.58539	-0.02117	-0.27394
sit10	HY	QT	1.41231	0.79821	-0.004262	-0.20048	0.66737	-1.70381
sit11	SN		-0.51039	0.46561	0.858663	-0.02378	0.29115	-0.37844
sit12	TK		0.06963	-0.90871	0.653799	1.06371	-1.21614	1.2438
sit13	TZ		-0.63138	0.55355	0.666559	-0.17008	-1.31339	-0.53645
sit14	LQ		-0.37971	-0.36189	0.420216	-0.41891	-0.76231	-0.36504
sit15	GC		-0.3208	-0.24933	-0.013302	-1.9032	0.88034	-0.08703
sit16	HZ		-0.08064	-0.11308	0.151405	1.31843	0.12866	-0.0341
sit17	HC		0.07394	0.03278	-0.075225	-0.19476	1.07398	-0.15652
sit18	YD		-0.51269	-0.98259	0.234836	1.70638	0.41028	-1.78272
sit19	ZK		-0.46228	0.00684	0.228315	0.60301	1.08615	0.48702
sit20	BYH		1.20031	-1.07116	-0.427407	0.29643	-0.50788	0.48178
sit21	TPSQ		0.55071	-1.02848	-0.35814	0.05731	0.39571	-0.69059
sit22	DL		-0.33942	1.03592	-0.207553	-0.5125	-0.92422	-0.20775
sit23	SU		1.29909	0.10922	0.017856	-0.13811	-0.79704	0.08999
sit24	SGDL	IM	-0.2596	1.06852	-0.150545	0.85998	-0.21535	0.71363
sit25	XWQ		1.78154	0.68628	-0.643096	0.4511	1.0474	0.87793
sit26	GY		-0.66308	1.7524	-0.05152	0.75093	-0.14649	1.19817
sit27	BYXL		-1.33424	0.2378	-3.479361	0.11844	-0.71105	-0.58571
sit28	HTXL		0.58751	-1.54605	-0.482117	0.41235	-0.16405	0.32864
sit29	FYD		-0.24612	-1.3296	-0.009788	-0.39788	-0.441	1.26361

Figure S1. Heat map of Pearson correlations among *S. chamaejasme* leaf P content, soil P and AP content, soil water content (SWC), mean annual precipitation (MAP), and altitude (ALT) in IM region

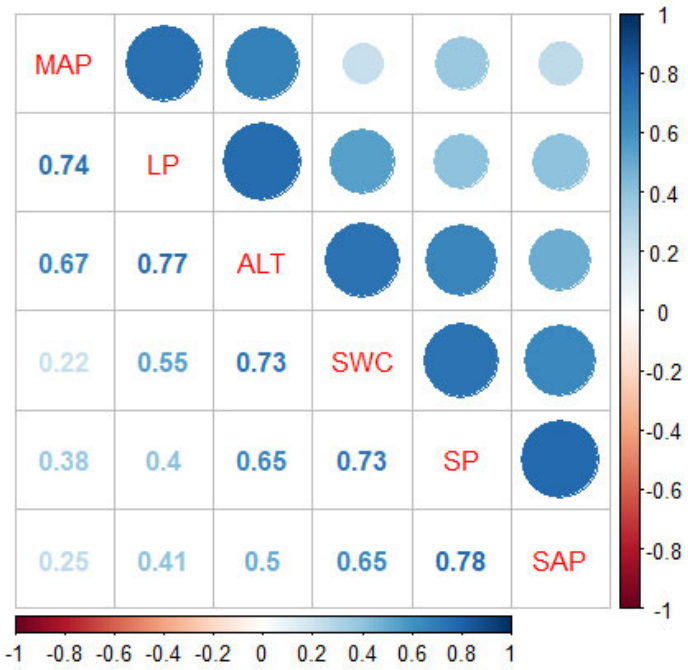

Figure S2. Biplot for the first two axes of soil physicochemical properties