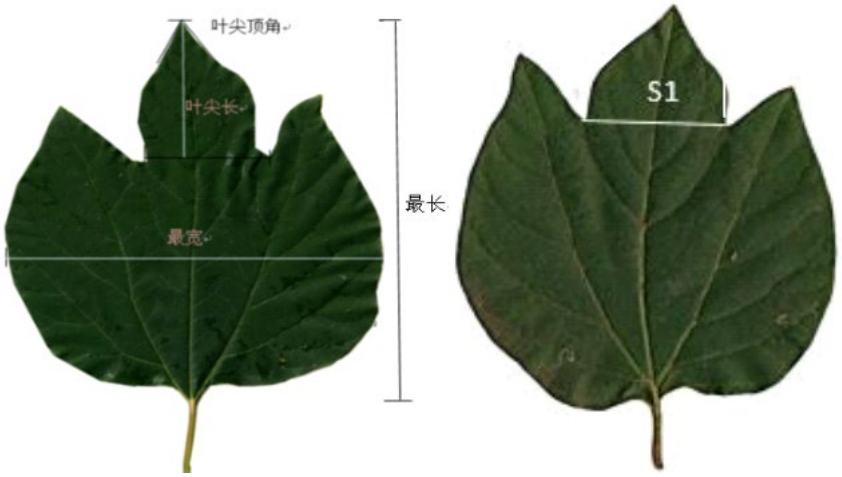
附录 1　野外调查与同质园实验采样信息表

Appendix 1　Sampling information of field survey and common garden experiment

区域 Region	种群 Population	经度 Longitude	纬度 Latitude	野外叶片调查个体数 Sample size of field investigation of leaves	野外种子调查个体数 (种子数目) Sample size of field investigation of seeds (number of seeds)	同质园实验样本量 Sample size of common garden experiment
北部 North East Asia (NEA)	仙人洞 XRD	122.95	39.99	18	9 (1661)	29
	昆嵛山 KYS	121.44	37.16	10	6 (719)	14
	云台山 YTS	119.27	34.43	6	1 (105)	2
	kitagoJAP1	138.15	36.72	2	-	-
	ura-hikimiJAP2	132.05	34.55	1	1 (91)	-
东南部 Eastern South East Asia (E-SEA)	清凉峰 QLF	118.84	30.13	10	13 (1999)	21
	神农架 SNJ	110.44	31.69	11	-	2
	鹞落坪 YLP	116.11	31.01	10	-	-
	鞍子河 AZH	103.13	30.81	7	-	-
	武功山 WGS	114.23	27.55	11	-	-
	八大公山 BDGS	109.79	29.69	13	-	-
	米仓山 MCS	107.53	32.69	14	-	-
	历山 LS	111.98	35.43	11	-	-
西南部 Western South East Asia (W-SEA)	片马 PM	98.4	25.59	7	-	6
	兰坪 LP	99.2	26.27	5	-	14
	西藏 XZ	99.2	27.19	7	-	19
	小中甸 XZD	99.84	27.34	-	5 (568)	-
	维西 WX	99.29	29.87	8	5 (590)	-



附录 2　三桠乌药叶性状测量指标。

Appendix 2　Measurements of leaf traits of *Lindera obtusiloba*.

附录 3　不同区域三桠乌药种子的发芽率

Appendix 3　Germination rates of *Lindera obtusiloba* seeds from different regions

区域 Region	种群 Population	种子数 Number of seeds	发芽率 Germination rate
北部 North East Asia (NEA)	仙人洞 XRD	300	64.67%
	昆嵛山 KYS	300	73.33%
	ura-hikimiJAP2	60	51.67%
东南部 Eastern South East Asia (E-SEA)	清凉峰 QLF	300	6.33%
西南部 Western South East Asia (W-SEA)	维西 WX	200	8.00%

第一组		
E-SEA	W-SEA	NEA
W-SEA	NEA	E-SEA
NEA	E-SEA	W-SEA
E-SEA	W-SEA	NEA
W-SEA	NEA	E-SEA
NEA	E-SEA	W-SEA
E-SEA	W-SEA	NEA
W-SEA	NEA	E-SEA
NEA	E-SEA	W-SEA
E-SEA	W-SEA	NEA
W-SEA	NEA	W-SEA
NEA	W-SEA	NEA
NEA	NEA	W-SEA
W-SEA	NEA	NEA
NEA	W-SEA	W-SEA
NEA	NEA	W-SEA

第二组		
W-SEA	NEA	E-SEA
NEA	E-SEA	W-SEA
E-SEA	W-SEA	NEA
W-SEA	NEA	E-SEA
NEA	E-SEA	W-SEA
E-SEA	W-SEA	NEA
W-SEA	NEA	E-SEA
NEA	E-SEA	W-SEA
E-SEA	W-SEA	NEA
W-SEA	NEA	E-SEA
NEA	W-SEA	W-SEA
NEA	NEA	W-SEA
W-SEA	NEA	NEA
NEA	W-SEA	NEA
W-SEA	NEA	W-SEA
W-SEA	NEA	NEA

第三组		
NEA	E-SEA	W-SEA
E-SEA	W-SEA	NEA
W-SEA	NEA	E-SEA
NEA	E-SEA	W-SEA
E-SEA	W-SEA	NEA
W-SEA	NEA	E-SEA
NEA	E-SEA	W-SEA
E-SEA	W-SEA	NEA
W-SEA	NEA	E-SEA
NEA	E-SEA	W-SEA
W-SEA	W-SEA	NEA
W-SEA	NEA	NEA
NEA	W-SEA	NEA
NEA	NEA	W-SEA
W-SEA	W-SEA	NEA
NEA	W-SEA	NEA

附录 4　三桠乌药同质园实验中北部(NEA)、东南部(E-SEA)和西南部(W-SEA)区域幼苗栽种方式。

Appendix 4　Planting method of *Lindera obtusiloba* seedlings in common garden experiment from North East Asia (NEA), Eastern South East Asia (E-SEA) and Western South East Asia (W-SEA) regions.



附录 5　三桠乌药幼苗生长过程。1: 萌芽; 2: 显叶; 3: 开展; 4: 开放芽; 5: 成熟芽; 6: 黄叶; 7: 脱叶。
Appendix 5　Growth process of *Lindera obtusiloba* seedlings. 1, Bud; 2, Leaf emergence; 3, Unfolding; 4, Open bud; 5, Mature bud; 6, Yellow leaf; 7, Leaf fall.

附录 6　三桠乌药表型和生理性状与环境因子相关性分析中的环境变量

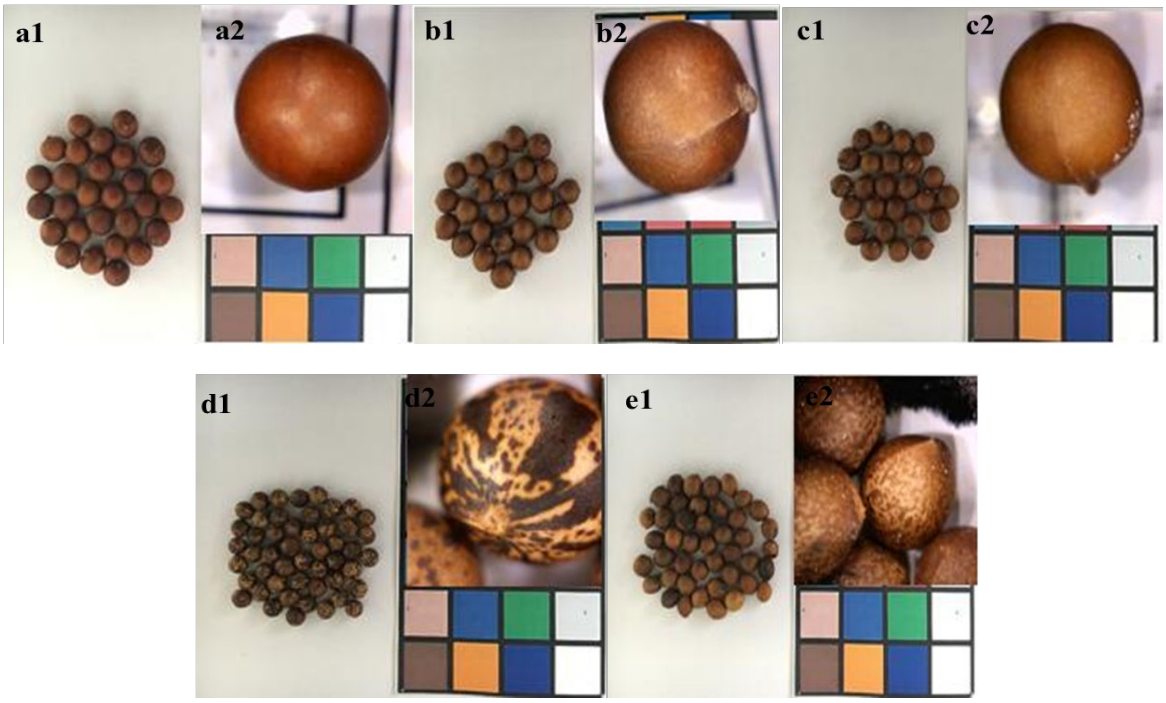
Appendix 6　Environmental variables used in the correlation analyses of phenotypic and physiological traits and environment factor of *Lindera obtusiloba*

变量 Variable	描述 Description
Bio2	日温度平均范围 Mean diurnal range
Bio3	等温性 Isothermality
Bio8	最湿季平均温度 Mean temperature of wettest quarter
Bio9	最干季平均温度 Mean temperature of driest quarter
Bio18	最暖季降水 Precipitation of warmest quarter
Soil	土壤最大含水量 Awc for rootable depth
Elev	海拔 Elevation
Uvb	年平均紫外线辐射 Annual mean ultraviolet-b radiation

附录 7　三桠乌药叶性状主成分分析中的变量及第一主成分和第二主成分的标准化因子载荷

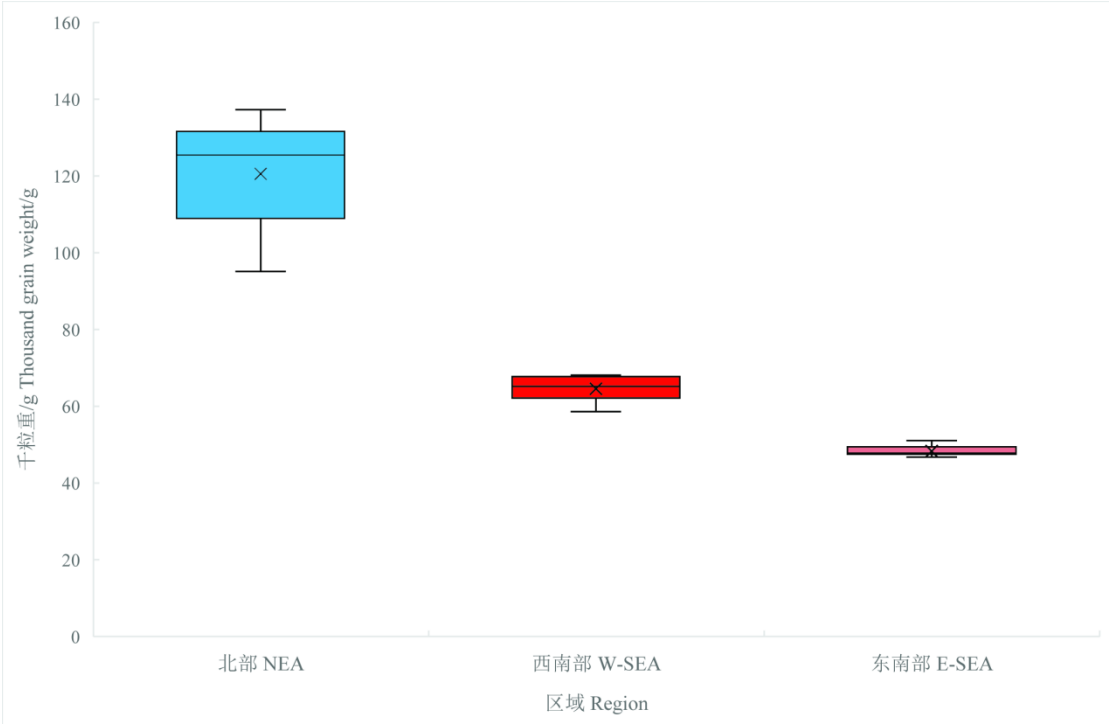
Appendix 7　Variables, standardized loadings for the two first axes of the principal component analysis of leaf characters in *Lindera obtusiloba*

变量 Variables	野外调查 Field investigation		同质园实验 Common garden		野外调查加同质园实验 Field investigation and common garden	
	第一主成分 Principal component 1	第二主成分 Principal component 2	第一主成分 Principal component 1	第二主成分 Principal component 2	第一主成分 Principal component 1	第二主成分 Principal component 2
面积 Area	0.39	0.04	0.45	0.23	0.40	0.06
周长 Circumference	0.41	−0.15	0.47	0.13	0.42	0.14
叶尖角度 Tip angle	–0.29	−0.34	0.10	0.59	-0.26	0.52
最长 Longest length	0.41	0.26	0.45	0.17	0.41	−0.10
最长/最宽 Longest length/Widest length	0.10	0.72	−0.26	−0.14	−0.02	−0.80
叶尖长 Tip length	0.43	−0.10	0.37	−0.17	0.41	−0.04
中间裂片面积 Area of middle lobe	0.42	−0.17	0.35	−0.44	0.42	0.04
叶裂数 Number of leaf lobes	0.24	−0.48	0.21	−0.56	0.31	0.24



附录 8　不同区域三桠乌药种子形态。a: JAP2; b: 昆嵛山; c: 仙人洞; d: 清凉峰; e: 维西。

Appendix 8　Morphological characteristics of *Lindera obtusiloba* seeds in different regions. a, ura-hikimi; b, KYS; c, XRD; d, QLF; e, WX.



附录 9　三桠乌药北部(NEA)、东南部(E-SEA)和西南部(W-SEA)区域种群千粒重。× 表示平均值，中间横线表示中位值。

Appendix 9　Thousand grain weight of *Lindera obtusiloba* of North East Asia (NEA), Eastern South East Asia (E-SEA) and Western South East Asia (W-SEA) regions. × represents mean value, the middle line represents median value.

附录 10　不同种群三桠乌药种子千粒重(g)

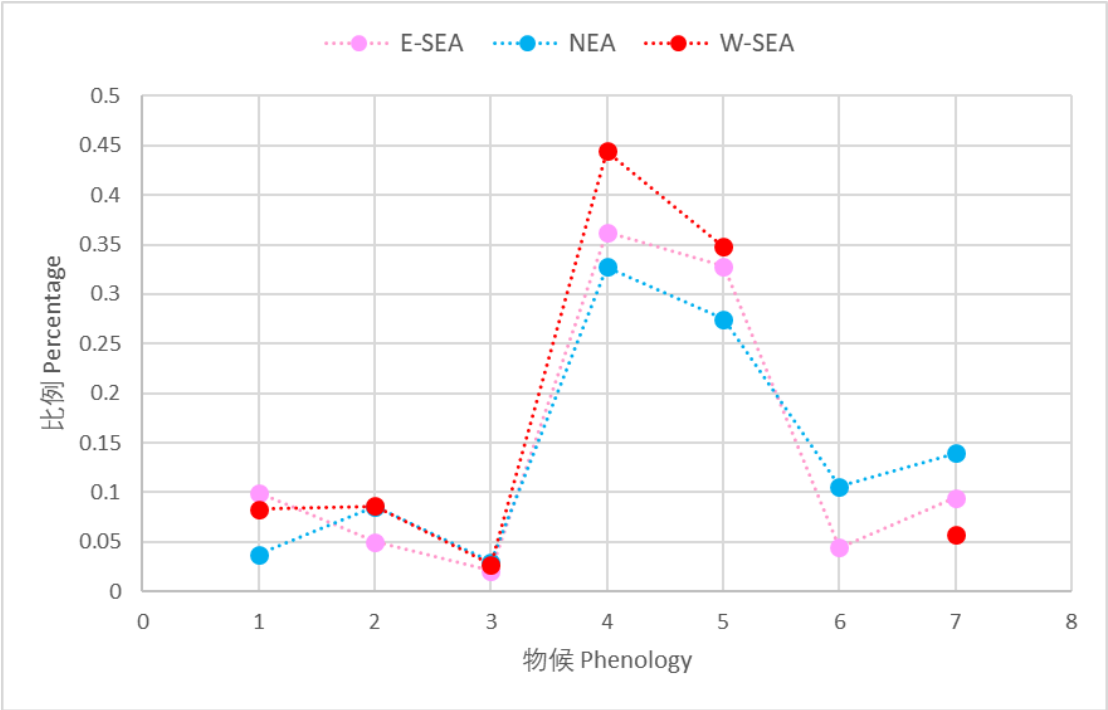
Appendix 10　Thousand grain weight (g) of *Lindera obtusiloba* seeds from different populations

区域 Region	种群 Population	个体 Individual	千粒重 Thousand grain weight (g)
北部 North East Asia (NEA)	昆嵛山 KYS	1	122.05
北部 North East Asia (NEA)	昆嵛山 KYS	2	117.96
北部 North East Asia (NEA)	昆嵛山 KYS	3	118.43
北部 North East Asia (NEA)	昆嵛山 KYS	4	128.97
北部 North East Asia (NEA)	昆嵛山 KYS	5	131.45
北部 North East Asia (NEA)	昆嵛山 KYS	6	133.38
北部 North East Asia (NEA)	云台山 YTS	7	104.22
北部 North East Asia (NEA)	仙人洞 XRD	8	137.29
北部 North East Asia (NEA)	仙人洞 XRD	9	131.73
北部 North East Asia (NEA)	仙人洞 XRD	10	136.19
北部 North East Asia (NEA)	仙人洞 XRD	11	125.47
北部 North East Asia (NEA)	仙人洞 XRD	12	126.12
北部 North East Asia (NEA)	仙人洞 XRD	13	127.78
北部 North East Asia (NEA)	仙人洞 XRD	14	97.08
北部 North East Asia (NEA)	仙人洞 XRD	15	102.56
北部 North East Asia (NEA)	仙人洞 XRD	16	95.12
北部 North East Asia (NEA)	ura-hikimiJAP2	17	113.70
西南部 Western South East Asia (W-SEA)	维西 WX	18	63.53
西南部 Western South East Asia (W-SEA)	维西 WX	19	63.28
西南部 Western South East Asia (W-SEA)	维西 WX	20	63.46
西南部 Western South East Asia (W-SEA)	维西 WX	21	58.69
西南部 Western South East Asia (W-SEA)	维西 WX	22	58.57
西南部 Western South East Asia (W-SEA)	小中甸 XZD	23	67.94
西南部 Western South East Asia (W-SEA)	小中甸 XZD	24	67.64
西南部 Western South East Asia (W-SEA)	小中甸 XZD	25	66.79
西南部 Western South East Asia (W-SEA)	小中甸 XZD	26	67.41
西南部 Western South East Asia (W-SEA)	小中甸 XZD	27	68.12
东南部 Eastern South East Asia (E-SEA)	清凉峰 QLF	28	47.59
东南部 Eastern South East Asia (E-SEA)	清凉峰 QLF	29	46.99
东南部 Eastern South East Asia (E-SEA)	清凉峰 QLF	30	46.75
东南部 Eastern South East Asia (E-SEA)	清凉峰 QLF	31	47.51
东南部 Eastern South East Asia (E-SEA)	清凉峰 QLF	32	48.91
东南部 Eastern South East Asia (E-SEA)	清凉峰 QLF	33	47.77
东南部 Eastern South East Asia (E-SEA)	清凉峰 QLF	34	47.65
东南部 Eastern South East Asia (E-SEA)	清凉峰 QLF	35	47.53
东南部 Eastern South East Asia (E-SEA)	清凉峰 QLF	36	47.85
东南部 Eastern South East Asia (E-SEA)	清凉峰 QLF	37	47.75
东南部 Eastern South East Asia (E-SEA)	清凉峰 QLF	38	50.50
东南部 Eastern South East Asia (E-SEA)	清凉峰 QLF	39	49.92
东南部 Eastern South East Asia (E-SEA)	清凉峰 QLF	40	51.06

附录 11　三桠乌药不同区域不同物候时期天数及差异

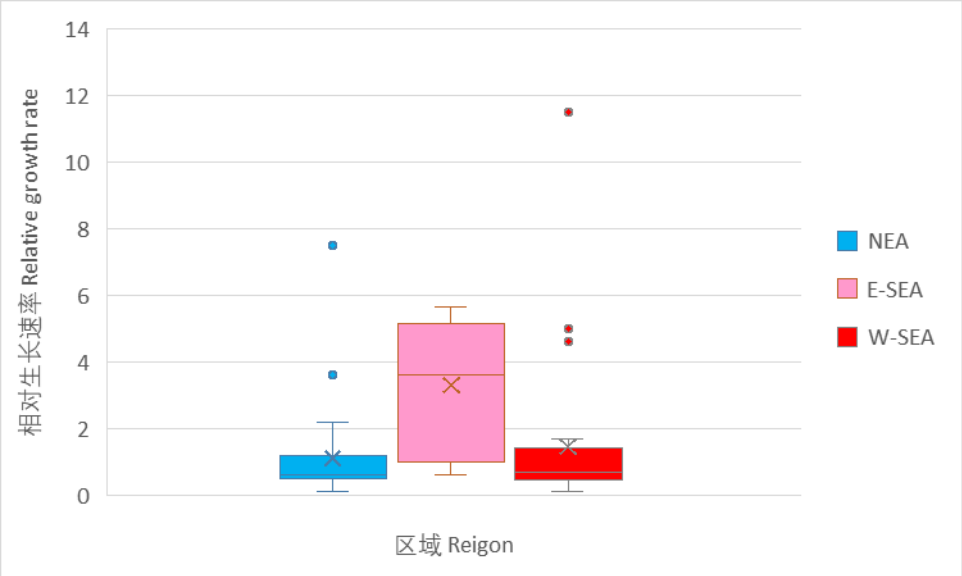
Appendix 11　The number and differences of different phenological periods in different regions of *Lindera obtusiloba*. NEA, North East Asia; E-SEA, Eastern South East Asia; W-SEA, Western South East Asia.

物候 Phenology	区域 Region	*N*	平均值 Mean	标准差 Standard deviation	*P* (NEA vs. E-SEA)	*P* (NEA vs. W-SEA)	*P* (E-SEA vs. W-SEA)
0-1 萌芽物候 0-1 Bud phenology	北部 NEA	45	9.84	9.70	<0.001	0.003	<0.005
	东南部 E-SEA	23	29.70	13.44			
	西南部 W-SEA	39	18.26	12.26			
1-2 显叶物候 1-2 Leaf emergence phenology	北部 NEA	43	22.56	7.22	0.004	0.194	0.308
	东南部 E-SEA	21	14.90	8.69			
	西南部 W-SEA	38	18.92	10.07			
1-3 展叶物候 1-3 Unfolding phenology	北部 NEA	41	30.29	6.60	<0.001	0.03	<0.001
	东南部 E-SEA	21	21.10	8.49			
	西南部 W-SEA	37	24.86	10.71			
1-4 开放芽物候 1-4 Open bud phenology	北部 NEA	32	116.38	32.32	0.338	0.74	0.724
	东南部 E-SEA	14	129.07	21.82			
	西南部 W-SEA	27	122.56	18.34			
1-5 成熟芽物候 1-5 Mature bud phenology	北部 NEA	24	188.67	43.42	0.001	0.98	0.74
	东南部 E-SEA	10	226.90	9.53			
	西南部 W-SEA	4	199.00	51.90			
1-6 黄叶物候 1-6 Yellow leaf phenology	北部 NEA	22	216.45	36.26	0.042	0.821	0.508
	东南部 E-SEA	10	240.00	14.91			
	西南部 W-SEA	3	189.00	49.00			
1-7 脱叶物候 1-7 Leaf fall phenology	北部 NEA	22	253.18	35.18	0.242	0.54	0.403
	东南部 E-SEA	10	268.20	12.72			
	西南部 W-SEA	3	201.67	52.69			



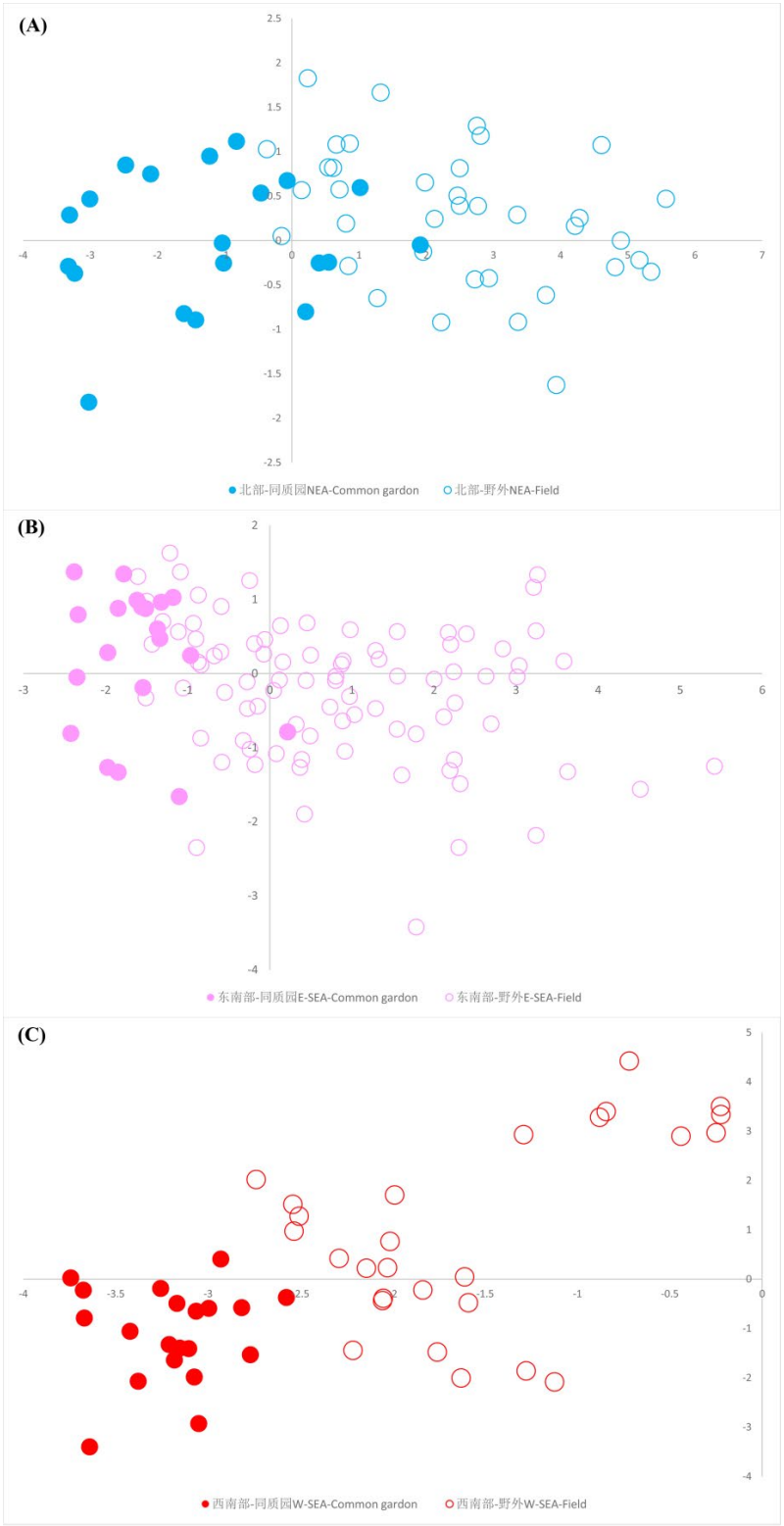
附录 12　三桠乌药北部(NEA)、东南部(E-SEA)和西南部(W-SEA)区域不同物候阶段时间所占比例。1: 萌芽; 2: 显叶; 3: 开展;　4: 开放芽; 5: 成熟芽; 6: 黄叶; 7: 脱叶。

Appendix 12　Proportion of different phenological phases of North East Asia (NEA), Eastern South East Asia (E-SEA) and Western South East Asia (W-SEA) of *Lindera obtusiloba*. 1, Bud; 2, Leaf emergence; 3, Unfolding; 4, Open bud; 5, Mature bud; 6, Yellow leaf; 7, Leaf fall.



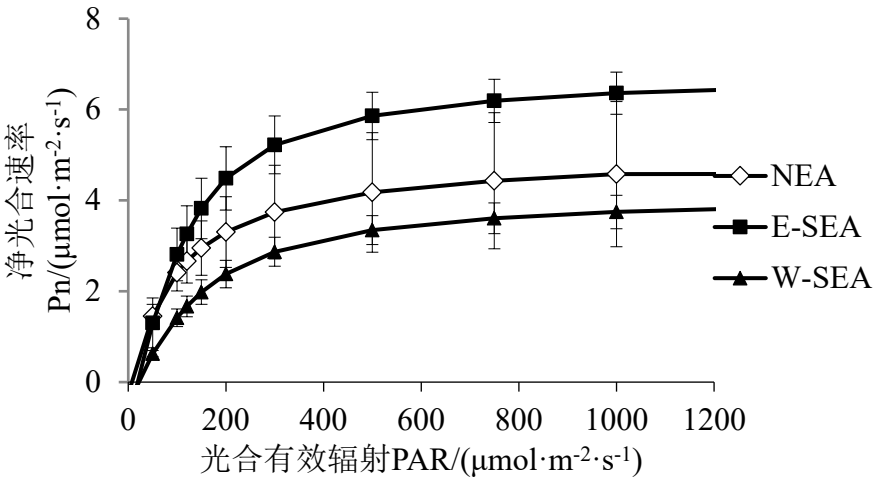
附录 13　三桠乌药北部(NEA)、东南部(E-SEA)和西南部(W-SEA)区域幼苗相对生长速率差异

Appendix 13　The differences in relative growth rates of *Lindera obtusiloba* seedlings in North East Asia (NEA), Eastern South East Asia (E-SEA) and Western South East Asia (W-SEA)



附录 14　三桠乌药野外调查和同质园实验的叶性状主成分分析。北部(A)、东南部(B)和西南部(C)区域种群用蓝色、粉色和红色表示。

Appendix 14　Principal component analysis of leaf traits in field investigation and common garden experiment of *Lindera obtusilba*. The populations of North East Asia (NEA), Eastern South East Asia (E-SEA) and Western South East Asia (W-SEA) regions are represented by blue, pink and red respectively.



附录 15　三桠乌药北部(NEA)、东南部(E-SEA)和西南部(W-SEA)区域个体的光响应曲线

Appendix 15　Light response curves of individuals from North East Asia (NEA), Eastern South East Asia (E-SEA) and Western South East Asia (W-SEA) of *Lindera obtusiloba*

附录 16　三桠乌药野生种群叶性状与环境变量冗余分析中变量与 RDA 的相关性及解释方差

Appendix 16　Correlation between variables and RDA and the explained variance in the redundancy analysis of leaf traits of wild *Lindera obtusiloba* populations and environmental factors

变量 Variable	解释方差 Explained variance	RDA1	RDA2
海拔 Elevation (Elev)	10.81%	0.403	-0.011
土壤 AWC for rootable depth (Soil)	23.23%	0.440	-0.166
紫外线辐射 Annual mean ultraviolet-b radiation (UVB)	38.69%	0.837	0.141
日温度平均范围 Mean diurnal range (Bio2)	4.54%	0.204	0.103
等温性 Isothermality (Bio3)	22.68%	0.682	-0.094
最湿季平均温度 Mean temperature of wettest quarter (Bio8)	8.21%	-0.033	-0.065
最干季平均温度 Mean temperature of driest quarter (Bio9)	45.94%	0.867	-0.223
最暖季降水量 Precipitation of warmest quarter (Bio18)	9.80%	0.304	-0.160