

Supplement 1: Data analysis of morphological characters of five populations of *L. undulata* planted in growth chamber conditions

		Sum of squares	Df	Mean square	F value	Significant
Leaf. L	Between Groups	96.813	4	24.203	21.086	.000
	Within Groups	28.696	25	1.148		
	Total	125.510	29			
H.adax.D	Between Groups	24.000	4	6.000	6.207	.001
	Within Groups	24.167	25	.967		
	Total	48.167	29			
H.abax.D	Between Groups	127.200	4	31.800	14.324	.000
	Within Groups	55.500	25	2.220		
	Total	182.700	29			
Lobe.NO.	Between Groups	194.867	4	48.717	18.178	.000
	Within Groups	67.000	25	2.680		
	Total	261.867	29			
L.Area	Between Groups	39.316	4	9.829	6.629	.001
	Within Groups	37.066	25	1.483		
	Total	76.382	29			
Leaf.W	Between Groups	2.784	4	.696	16.406	.000
	Within Groups	1.060	25	.042		
	Total	3.844	29			
Flower.NO	Between Groups	271.200	4	67.800	57.458	.000
	Within Groups	29.500	25	1.180		
	Total	300.700	29			
Seed.W	Between Groups	1.179	4	.295	69.846	.000
	Within Groups	.106	25	.004		
	Total	1.285	29			
Beak.L	Between Groups	58.226	4	14.556	99.154	.000
	Within Groups	3.670	25	.147		
	Total	61.896	29			
Stigma.L	Between Groups	.142	4	.035	2.799	.048
	Within Groups	.316	25	.013		
	Total	.458	29			
Style.L	Between Groups	2.354	4	.588	3.630	.018
	Within Groups	4.052	25	.162		
	Total	6.406	29			
Stamen.L	Between Groups	7.867	4	1.967	10.050	.000
	Within Groups	4.892	25	.196		
	Total	12.759	29			
Seed.L	Between Groups	2.395	4	.599	47.917	.000
	Within Groups	.312	25	.012		
	Total	2.708	29			

Supplement 2: Basic statistical data for morphological characteristics of five *L.undulata* populations in Iran

Population	Characteristics													
	Achene L/W index	Beak Length (mm)	Achene Width(mm)	Achene Length(mm)	No. of Flower	Style length (mm)	Stigma length (mm)	Stamen length (mm)	Leaf width(cm)	Leaf area (cm ²)	No. of leaf lobe	Hair density on abaxial	Hair density on adaxial	Leaf length(cm)
Mirzabaylu	3.93±0.09b	11.24±0.05a	0.64±0.04c	2.52±0.06d	23±0.07a	0.75±0.17abc	0.55± 0.0a	5.07±0.33b	1.87±0.09b	4.8±0.29bc	14.8±0.47a	4±0.44b*	3.66±0.61a	12.18±0.65a
Cheshmeh Ali	2.81 ± 0.02d	7.78 ±0.09 d	0.86±0.02 b	2.43 ±0.05 d	18.33 ±0.55b	0.47 ±0.17 c	0.4 ±0.04 bc	6.32 ±0.13 a	1.9 ±0.07b	6.05±0.51 b	15 ±0.73 a	4 ±0.36 b	2.33 ±0.21 b	9.073±0.32c
Firoozkooh	3.11 ± 0.12c	9.08 ±0.04 c	0.89±0.02 b	2.76 ±0.02 c	18 ±0.44 b	1.07 ±0.25 a	0.51 ± 0.07 ab	6.09 ±0.13 a	1.37 ±0.07c	6 ±0.75 ab	8.66 ±1.11 c	7.33 ±0.76 a	1.16 ±0.16 b	10.62±0.43b
Qom	5.05 ± 0.05a	7.87 ±0.13 d	0.63 ±0.01 c	3.19 ±0.06 a	16.33 ±0.3 c	0.26 ±0.07 c	0.42 ±0.01abc	5.23 ±0.11 b	1.88 ±0.10b	3.75 ±0.36 c	11 ±0.36 b	4.33 ±0.95 b	2.33 ±0.49 b	6.91±0.31d
Biarmand	2.55 ± 0.06d	10.55±0.30 b	1.17±0.04 a	2.98 ±0.05 b	13.83 ±0.60d	0.82 ±0.05ab	0.37 ±0.05 c	5.24 ±0.05 b	2.33 ±0.06a	7.06 ±0.42 a	10.16 ±0.3bc	0.83 ±0.16 c	1.28 ±0.28 b	8.6±0.35c

The letters indicate a significant difference.

Supplement 3: Mantel test

No. Samples	100	No. in Matrix	4950	-	-
No. Permutations	99	-	-	-	-
SSx	SSy	SPxy	Rxy	P(rxy-rand >= rxy-data)	
204741199.411	133830.020	774452.820	0.148	0.010	-