Supplementary material

**Effects of livestock on genetic variation OF CREOSOTE BUSHES IN PATAGONIAN RANGELANDS**

**C. Souto & M. Tadey**

**Summary** Table S1. Paddocks’ area, stocking age and rate, and mean plant cover, Table S2. LME models showing the relationship of percentage of browsing, dung density, plant cover, plant species richness and stocking rate, Table S3. Relative contribution measures in sampled paddocks, Table S4. LME models showing the relationship between plant characteristics, and browsing index and stocking rate, Table S5. Neutrality tests for 12 isozyme loci in 18 populations of L. divaricate and L. cuneifolia in Monte Desert, Fig. S1. Bivariate relation between browsing index, dung density, plant cover, plant richness and stocking rate, Fig. S2. Average variation parameters for sampled *Larrea sps.* individuals that contribute more than 50 relative weight factor (RWF) to the next generation in orange, and for individuals that contribute less than 50 RWF in blue.Fig. S3. UPGMA of Nei´s genetic distance for *Larrea sps.* from ten paddocks in Monte Desert.

**Table** S**1** Sampled paddocks, paddock size in hectares, number of years each paddock had been sustaining similar disturbance levels, raw stock rate with stocking level in brackets, mean plant cover per paddock (all species). LC and LD are *Larrea* *cuneifolia* and *Larrea* *divaricata* respectively and mean cover for each species in 30 circular plots of 5 m2 in each paddock.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Paddock* | *Area*  *(Ha)* | *Stocking*  *age rate* | | *Mean cover*  *(%)* |
| Mangrullo  (MA) | 25,000 | 30 | 0.0020  (L) | 52.29 |
|
| Bustingorri  (Bu) | 7,500 | 30 | 0.0025  (L) | 53.96 |
|
| Campo1  (C1) | 94 | 10 | 0.0030 (M) | 49.26 |
|
| Campo A  (CA) | 22,9650 | 30 | 0.0039  (M) | 24.77 |
|
| Guevara  (G) | 3,500 | 10 | 0.0132  (M) | 34.16 |
|
| Bustamante  (Bt) | 4,500 | 10 | 0.0212  (M) | 10.62 |
|
| M. Avila  (AMO) | 550 | 10 | 0.0631  (H) | 38.96 |
|
| D. Avila  (ADA) | 970 | 10 | 0.0696  (H) | 29.00 |
|
| H. López  (HL) | 7,500 | 30 | 0.0308  (H) | 16.40 |
| M. Arriba  (Maarr) | 5,000 | 30 | 0.0544  (H) | 12.86 |

**Table S2** Linear mixed-effects model fit by REML Models showing the relationship of percentage of browsing, dung density, plant cover, plant species richness and stocking rate in 10 paddocks dominated by *Larrea* sps. in Patagonia Monte Desert. These models have species and paddocks as random factors. DF, degrees of freedom for each model.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Model* | *R-squared* | *t-statistic* | *DF* | *p-value* |
| lme (SR ~ browsing, data = LMall) | 0.308 | 7.104 | 11 | 0.000 |
| lme (SR ~ dungdens, data = LMall) | 0.326 | 2.779 | 11 | 0.013 |
| lme (SR~ plantcover, data = LMall) | 0.254 | -7.409 | 11 | 0.008 |
| lme (SR~ richness, data = LMall) | 0.469 | -6.621 | 11 | 0.009 |

**Table S3** Relative contribution measures in 10 paddocks dominated by *Larrea* sps in Monte desert. SL: Stocking level, L: Low, I: Intermediate, H: High. LC: *Larrea cuneifolia*, LD: *Larrea divaricata*. 5/50 or more: number of individuals contributing 5/50 or more individuals to the next generation /# total number of individuals, ACNG: Average contribution to the next generation

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *Paddock* | *SL* | *Sp.* | *5 or more* | *50 or more* | *ACNG* |
| **Mangrullo** | L | LC | 0.100 | 0.000 | 2.800 |
| LD | 0.321 | 0.000 | 3.821 |
| **Bustingorri** | L | LC | 0.667 | 0.000 | 8.666 |
| LD | 0.321 | 0.000 | 3.750 |
| **Campo 1** | M | LC | 0.800 | 0.000 | 7.633 |
| LD | 0.815 | 0.000 | 11.518 |
| **Campo A** | M | LC | 0.633 | 0.000 | 5.600 |
| LD | 0.967 | 0.033 | 19.733 |
| **Guevara** | M | LC | 0.926 | 0.111 | 26.852 |
| LD | 0.000 | 0.000 | 2.333 |
| **Bustamante** | M | LC | 0.893 | 0.321 | 56.286 |
| LD | 0.733 | 0.166 | 21.833 |
| **M. Avila** | H | LC | 0.933 | 0.133 | 24.233 |
| LD | 0.931 | 0.103 | 27.000 |
| **D. Avila** | H | LC | 0.966 | 0.133 | 28.433 |
| LD | 0.962 | 0.000 | 13.461 |
| **H. López** | H | LD | 0.933 | 0.733 | 131.633 |
| **M. Arriba** | H | LD | 0.600 | 0.400 | 162.667 |

**Table S4** Linear mixed-effects model fit by package nlme in R, showing the relationship between plant characteristics (response variables): height (**H**), diameter (**D**), size (**S**) and reproductive status (**R**), and the explanatory variables (browsing index (BI), stocking rate (SR)). Using species (sp) and stocking level (SL) as random factors and a weights function to deal with heterogeneity. See figure 2 in the main text.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Model* | *DF* | *t-value* | *p-value* | *AIC* |
| lme(**H** ~ BI, random = ~1|sp/SL, weights=varIdent(form=~1|SL)) | 11 | -3.66 | 0.004 | 24.33 |
| lme(**H** ~ SR random = ~1|sp/SL, weights=varIdent(form=~1|SL)) | 11 | -2.31 | 0.041 | 4.65 |
| lme(**D** ~ BI, random = ~1|sp/SL, weights=varIdent(form=~1|SL)) | 11 | -3.66 | 0.003 | 22.33 |
| lme(**D** ~ SR, random = ~1|sp/SL, weights=varIdent(form=~1|SL)) | 11 | -2.04 | 0.070 | 21.20 |
| lme(**S** ~ BI, random = ~1|sp/SL, weights=varIdent(form=~1|SL)) | 11 | -6.32 | 0.000 | 45.54 |
| lme(**S** ~ SR, random = ~1|sp/SL, weights=varIdent(form=~1|SL)) | 11 | -2.05 | 0.064 | 51.02 |
| lme(**R** ~ BI, random = ~1|sp/SL, weights=varIdent(form=~1|SL)) | 11 | -4.26 | 0.001 | 27.10 |
| lme(**R** ~ SR, random = ~1|sp/SL, weights=varIdent(form=~1|SL)) | 11 | -2.11 | 0.058 | 30.57 |

**Table S5** Neutrality tests for 12 isozyme loci in 18 populations of *L. cuneifolia* (LC) and *L. divaricata* (LD) in Monte Desert. Calculated using the Ewens-Watterson Test for Neutrality. [See Manly (1985) 'The Statistics of Natural Selection' (p.272-282)]. In POPGENE ver 1.31 (1999). L95 and U95, which are, respectively, the lower and upper limits of the 95% confidence interval of Nul F, were estimated through 1,000 simulations in this program. If Obs.F is within this confidence interval, the locus is neutral; otherwise, it is not.

Population Name: LC, M. Avila

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Locus n k Obs. F Min F Max F Mean\* SE\* L95\* U95\*

=================================================================

ME1 60 2 0.9050 0.5000 0.9672 0.7923 0.0264 0.5022 0.9672

ME2 60 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

SKDH 60 3 0.5550 0.3333 0.9356 0.6437 0.0291 0.3683 0.9350

IDH 60 2 0.5272 0.5000 0.9672 0.7908 0.0274 0.5022 0.9672

MNR 60 3 0.5006 0.3333 0.9356 0.6413 0.0305 0.3650 0.9350

PERcat 60 3 0.5772 0.3333 0.9356 0.6394 0.0304 0.3539 0.9350

PGI1 60 3 0.4650 0.3333 0.9356 0.6397 0.0306 0.3539 0.9350

PGI2 60 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

PGI3 60 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

PER1 60 3 0.3772 0.3333 0.9356 0.6346 0.0314 0.3506 0.9350

MDH1 60 3 0.5089 0.3333 0.9356 0.6441 0.0295 0.3683 0.9350

MDH2 60 3 0.7133 0.3333 0.9356 0.6405 0.0305 0.3550 0.9350

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**Cont. Table S5** Neutrality tests

Population Name: LC, Bustamante

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Locus n k Obs. F Min F Max F Mean\* SE\* L95\* U95\*

=================================================================

ME1 56 2 0.9649 0.5000 0.9649 0.7913 0.0261 0.5026 0.9649

ME2 56 3 0.7213 0.3333 0.9311 0.6337 0.0294 0.3603 0.9305

SKDH 56 2 0.8087 0.5000 0.9649 0.7841 0.0258 0.5026 0.9649

IDH 56 3 0.3603 0.3333 0.9311 0.6299 0.0290 0.3603 0.9305

MNR 56 2 0.5517 0.5000 0.9649 0.7820 0.0275 0.5026 0.9649

PERcat 56 2 0.7812 0.5000 0.9649 0.7875 0.0268 0.5026 0.9649

PGI1 56 3 0.5670 0.3333 0.9311 0.6426 0.0280 0.3616 0.9305

PGI2 56 3 0.6180 0.3333 0.9311 0.6324 0.0293 0.3654 0.9305

PGI3 56 3 0.5944 0.3333 0.9311 0.6422 0.0301 0.3597 0.9305

PER1 56 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

MDH1 56 2 0.6078 0.5000 0.9649 0.7841 0.0273 0.5006 0.9649

MDH2 56 2 0.5000 0.5000 0.9649 0.7818 0.0269 0.5006 0.9649

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**Cont. Table S5** Neutrality tests

Population Name: LC, Campo A

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Locus n k Obs. F Min F Max F Mean\* SE\* L95\* U95\*

=================================================================

ME1 60 2 0.9356 0.5000 0.9672 0.7873 0.0272 0.5022 0.9672

ME2 60 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

SKDH 60 3 0.7133 0.3333 0.9356 0.6379 0.0295 0.3622 0.9350

IDH 60 3 0.6906 0.3333 0.9356 0.6355 0.0307 0.3606 0.9350

MNR 60 3 0.7406 0.3333 0.9356 0.6436 0.0287 0.3622 0.9350

PERcat 60 2 0.7450 0.5000 0.9672 0.7946 0.0262 0.5022 0.9672

PGI1 60 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

PGI2 60 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

PGI3 60 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

PER1 60 7 0.1833 0.1429 0.8200 0.3372 0.0127 0.1922 0.6239

MDH1 60 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

MDH2 60 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

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**Cont. Table S5** Neutrality tests

Population Name: LC, Campo 1

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Locus n k Obs. F Min F Max F Mean\* SE\* L95\* U95\*

=================================================================

ME1 60 3 0.8439 0.3333 0.9356 0.6551 0.0289 0.3672 0.9350

ME2 60 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

SKDH 60 2 0.7450 0.5000 0.9672 0.7878 0.0270 0.5022 0.9672

IDH 60 3 0.5239 0.3333 0.9356 0.6330 0.0292 0.3672 0.9350

MNR 60 4 0.6539 0.2500 0.9050 0.5297 0.0254 0.2989 0.8728

PERcat 60 2 0.9050 0.5000 0.9672 0.7905 0.0267 0.5022 0.9672

PGI1 60 3 0.6406 0.3333 0.9356 0.6433 0.0307 0.3606 0.9350

PGI2 60 5 0.3078 0.2000 0.8756 0.4523 0.0209 0.2506 0.7844

PGI3 60 3 0.7883 0.3333 0.9356 0.6367 0.0301 0.3606 0.9350

PER1 60 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

MDH1 60 2 0.8756 0.5000 0.9672 0.7844 0.0260 0.5022 0.9672

MDH2 60 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

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**Cont. Table S5** Neutrality tests

Population Name: LC, D. Avila

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Locus n k Obs. F Min F Max F Mean\* SE\* L95\* U95\*

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ME1 60 2 0.7450 0.5000 0.9672 0.7882 0.0266 0.5022 0.9672

ME2 60 2 0.5356 0.5000 0.9672 0.7939 0.0283 0.5022 0.9672

SKDH 60 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

IDH 60 2 0.8472 0.5000 0.9672 0.7823 0.0275 0.5022 0.9672

MNR 60 2 0.9672 0.5000 0.9672 0.7940 0.0270 0.5022 0.9672

PERcat 60 2 0.8756 0.5000 0.9672 0.7875 0.0263 0.5022 0.9672

PGI1 60 2 0.6422 0.5000 0.9672 0.7826 0.0268 0.5022 0.9672

PGI2 60 5 0.5311 0.2000 0.8756 0.4484 0.0188 0.2628 0.7589

PGI3 60 3 0.8733 0.3333 0.9356 0.6430 0.0302 0.3750 0.9350

PER1 60 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

MDH1 60 3 0.6950 0.3333 0.9356 0.6453 0.0291 0.3606 0.9350

MDH2 60 2 0.5089 0.5000 0.9672 0.7900 0.0267 0.5022 0.9672

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**Cont. Table S5** Neutrality tests

Population Name: LC, Guevara

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Locus n k Obs. F Min F Max F Mean\* SE\* L95\* U95\*

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ME1 54 3 0.5247 0.3333 0.9287 0.6375 0.0280 0.3690 0.9280

ME2 54 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

SKDH 54 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

IDH 54 2 0.7476 0.5000 0.9636 0.7778 0.0262 0.5027 0.9636

MNR 54 2 0.6756 0.5000 0.9636 0.7857 0.0274 0.5027 0.9636

PERcat 54 3 0.6296 0.3333 0.9287 0.6437 0.0287 0.3546 0.9280

PGI1 54 4 0.8265 0.2500 0.8951 0.5242 0.0235 0.2929 0.8594

PGI2 54 3 0.6303 0.3333 0.9287 0.6355 0.0284 0.3628 0.9280

PGI3 54 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

PER1 54 3 0.5274 0.3333 0.9287 0.6423 0.0296 0.3601 0.9280

MDH1 54 2 0.5062 0.5000 0.9636 0.7774 0.0261 0.5007 0.9636

MDH2 54 2 0.5988 0.5000 0.9636 0.7924 0.0253 0.5027 0.9636

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**Cont. Table S5** Neutrality tests

Population Name: LC, Mangrullo

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Locus n k Obs. F Min F Max F Mean\* SE\* L95\* U95\*

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ME1 60 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

ME2 60 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

SKDH 60 2 0.9672 0.5000 0.9672 0.7920 0.0257 0.5022 0.9672

IDH 60 2 0.5450 0.5000 0.9672 0.7909 0.0261 0.5050 0.9672

MNR 60 2 0.5272 0.5000 0.9672 0.7912 0.0271 0.5022 0.9672

PERcat 60 2 0.6089 0.5000 0.9672 0.7838 0.0275 0.5006 0.9672

PGI1 60 3 0.7106 0.3333 0.9356 0.6437 0.0303 0.3706 0.9350

PGI2 60 3 0.6106 0.3333 0.9356 0.6399 0.0302 0.3622 0.9350

PGI3 60 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

PER1 60 4 0.5906 0.2500 0.9050 0.5267 0.0241 0.3056 0.8728

MDH1 60 2 0.5939 0.5000 0.9672 0.7850 0.0272 0.5022 0.9672

MDH2 60 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

**Cont. Table S5** Neutrality tests

Population Name: LC, Bustingorry

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Locus n k Obs. F Min F Max F Mean\* SE\* L95\* U95\*

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ME1 60 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

ME2 60 2 0.8200 0.5000 0.9672 0.7861 0.0272 0.5022 0.9672

SKDH 60 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

IDH 60 2 0.6422 0.5000 0.9672 0.7845 0.0277 0.5022 0.9672

MNR 60 2 0.7450 0.5000 0.9672 0.7851 0.0282 0.5022 0.9672

PERcat 60 2 0.6422 0.5000 0.9672 0.7850 0.0286 0.5022 0.9672

PGI1 60 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

PGI2 60 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

PGI3 60 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

PER1 60 3 0.8172 0.3333 0.9356 0.6423 0.0307 0.3606 0.9350

MDH1 60 2 0.5272 0.5000 0.9672 0.7903 0.0273 0.5022 0.9672

MDH2 60 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

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**Cont. Table S5** Neutrality tests

Population Name: LD, M. Avila

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Locus n k Obs. F Min F Max F Mean\* SE\* L95\* U95\*

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ME1 58 2 0.6718 0.5000 0.9661 0.7885 0.0272 0.5006 0.9661

SKDH 58 3 0.8401 0.3333 0.9334 0.6322 0.0283 0.3585 0.9328

IDH 58 2 0.7622 0.5000 0.9661 0.7891 0.0265 0.5024 0.9661

MNR 58 3 0.7051 0.3333 0.9334 0.6297 0.0304 0.3668 0.9328

PERcat 58 2 0.9661 0.5000 0.9661 0.7934 0.0270 0.5006 0.9661

PGI1 58 3 0.6011 0.3333 0.9334 0.6286 0.0288 0.3609 0.9328

PGI2 58 3 0.3936 0.3333 0.9334 0.6420 0.0298 0.3627 0.9328

PGI3 58 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

PER1 58 3 0.4596 0.3333 0.9334 0.6494 0.0295 0.3573 0.9328

MDH1 58 3 0.4435 0.3333 0.9334 0.6445 0.0297 0.3585 0.9328

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**Cont. Table S5** Neutrality tests

Population Name: LD, Bustamante

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Locus n k Obs. F Min F Max F Mean\* SE\* L95\* U95\*

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ME1 60 2 0.7689 0.5000 0.9672 0.7921 0.0260 0.5022 0.9672

SKDH 60 3 0.7650 0.3333 0.9356 0.6397 0.0287 0.3650 0.9350

IDH 60 3 0.5489 0.3333 0.9356 0.6456 0.0296 0.3622 0.9350

MNR 60 2 0.5450 0.5000 0.9672 0.7912 0.0263 0.5006 0.9672

PERcat 60 2 0.5556 0.5000 0.9672 0.7823 0.0282 0.5022 0.9672

PGI1 60 3 0.3706 0.3333 0.9356 0.6348 0.0301 0.3650 0.9350

PGI2 60 3 0.3950 0.3333 0.9356 0.6417 0.0301 0.3706 0.9350

PGI3 60 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

PER1 60 3 0.6600 0.3333 0.9356 0.6490 0.0300 0.3672 0.9350

MDH1 60 3 0.6006 0.3333 0.9356 0.6472 0.0310 0.3672 0.9350

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**Cont. Table S5** Neutrality tests

Population Name: LD, H. López

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Locus n k Obs. F Min F Max F Mean\* SE\* L95\* U95\*

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SKDH 40 3 0.6987 0.3333 0.9050 0.6071 0.0266 0.3588 0.9037

IDH 60 3 0.7600 0.3333 0.9356 0.6371 0.0294 0.3550 0.9350

MNR 60 3 0.7106 0.3333 0.9356 0.6492 0.0301 0.3600 0.9350

PERcat 54 2 0.8025 0.5000 0.9636 0.7781 0.0275 0.5007 0.9636

PGI1 60 2 0.9050 0.5000 0.9672 0.7936 0.0275 0.5022 0.9672

PER1 60 4 0.7072 0.2500 0.9050 0.5460 0.0261 0.3133 0.8728

MDH1 60 3 0.7406 0.3333 0.9356 0.6463 0.0300 0.3650 0.9350

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Population Name: LD, M. Arriba

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Locus n k Obs. F Min F Max F Mean\* SE\* L95\* U95\*

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ME1 60 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

SKDH 60 2 0.7450 0.5000 0.9672 0.7826 0.0277 0.5022 0.9672

MNR 60 3 0.7872 0.3333 0.9356 0.6350 0.0300 0.3600 0.9350

PERcat 58 2 0.5595 0.5000 0.9661 0.7817 0.0263 0.5024 0.9661

PGI1 60 3 0.9350 0.3333 0.9356 0.6379 0.0292 0.3622 0.9350

PER1 60 5 0.4644 0.2000 0.8756 0.4484 0.0198 0.2494 0.7844

MDH1 60 3 0.8172 0.3333 0.9356 0.6509 0.0294 0.3683 0.9350

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**Cont. Table S5** Neutrality tests

Population Name: LD, Campo 1

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Locus n k Obs. F Min F Max F Mean\* SE\* L95\* U95\*

=================================================================

ME1 54 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

SKDH 54 2 0.6982 0.5000 0.9636 0.7854 0.0271 0.5027 0.9636

IDH 54 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

MNR 54 2 0.5247 0.5000 0.9636 0.7849 0.0272 0.5027 0.9636

PERcat 54 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

PGI1 54 3 0.3628 0.3333 0.9287 0.6364 0.0291 0.3628 0.9280

PGI2 54 4 0.5562 0.2500 0.8951 0.5339 0.0255 0.3052 0.8594

PGI3 54 2 0.8320 0.5000 0.9636 0.7831 0.0268 0.5027 0.9636

PER1 54 2 0.7743 0.5000 0.9636 0.7867 0.0262 0.5027 0.9636

MDH1 54 4 0.7963 0.2500 0.8951 0.5287 0.0249 0.3025 0.8594

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**Cont. Table S5** Neutrality tests

Population Name: LD, D. Avila

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Locus n k Obs. F Min F Max F Mean\* SE\* L95\* U95\*

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ME1 52 2 0.7138 0.5000 0.9623 0.7749 0.0263 0.5030 0.9623

SKDH 52 4 0.3964 0.2500 0.8913 0.5280 0.0241 0.3010 0.8543

IDH 52 2 0.9260 0.5000 0.9623 0.7720 0.0265 0.5007 0.9623

MNR 52 2 0.8913 0.5000 0.9623 0.7822 0.0265 0.5007 0.9623

PERcat 52 2 0.7396 0.5000 0.9623 0.7964 0.0259 0.5007 0.9623

PGI1 52 3 0.6183 0.3333 0.9260 0.6254 0.0290 0.3558 0.9253

PGI2 52 4 0.3217 0.2500 0.8913 0.5230 0.0239 0.2981 0.8543

PGI3 52 3 0.6457 0.3333 0.9260 0.6402 0.0279 0.3646 0.9253

PER1 52 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

MDH1 52 2 0.6250 0.5000 0.9623 0.7800 0.0270 0.5030 0.9623

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**Cont. Table S5** Neutrality tests

Population Name: LD, Guevara

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Locus n k Obs. F Min F Max F Mean\* SE\* L95\* U95\*

=================================================================

ME1 60 3 0.4939 0.3333 0.9356 0.6370 0.0283 0.3650 0.9350

SKDH 60 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

IDH 60 2 0.8756 0.5000 0.9672 0.7880 0.0280 0.5006 0.9672

MNR 60 3 0.7650 0.3333 0.9356 0.6407 0.0285 0.3606 0.9350

PERcat 60 2 0.6250 0.5000 0.9672 0.7868 0.0269 0.5022 0.9672

PGI1 60 3 0.8156 0.3333 0.9356 0.6364 0.0279 0.3739 0.9350

PGI2 60 5 0.4339 0.2000 0.8756 0.4509 0.0208 0.2594 0.7844

PGI3 60 2 0.8756 0.5000 0.9672 0.7957 0.0266 0.5022 0.9672

PER1 60 3 0.6289 0.3333 0.9356 0.6434 0.0291 0.3672 0.9350

MDH1 60 2 0.5050 0.5000 0.9672 0.7969 0.0267 0.5022 0.9672

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Population Name: LD, Campo A

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Locus n k Obs. F Min F Max F Mean\* SE\* L95\* U95\*

=================================================================

ME1 50 3 0.6632 0.3333 0.9232 0.6303 0.0271 0.3624 0.9224

SKDH 60 3 0.6200 0.3333 0.9356 0.6478 0.0309 0.3606 0.9350

IDH 60 2 0.8756 0.5000 0.9672 0.7911 0.0273 0.5022 0.9672

MNR 60 2 0.6089 0.5000 0.9672 0.7930 0.0273 0.5022 0.9672

PERcat 60 2 0.5672 0.5000 0.9672 0.7934 0.0269 0.5022 0.9672

PER1 48 4 0.4071 0.2500 0.8828 0.5270 0.0246 0.3047 0.8429

MDH1 60 2 0.8756 0.5000 0.9672 0.7836 0.0284 0.5022 0.9672

=================================================================

**Cont. Table S5** Neutrality tests

Population Name: LD, Mangrullo

=================================================================

Locus n k Obs. F Min F Max F Mean\* SE\* L95\* U95\*

=================================================================

ME1 56 2 0.6633 0.5000 0.9649 0.7796 0.0282 0.5006 0.9649

SKDH 56 2 0.6843 0.5000 0.9649 0.7840 0.0272 0.5026 0.9649

IDH 56 2 0.6435 0.5000 0.9649 0.7842 0.0268 0.5026 0.9649

MNR 56 4 0.4815 0.2500 0.8986 0.5246 0.0265 0.2985 0.8642

PERcat 56 2 0.5057 0.5000 0.9649 0.7940 0.0260 0.5026 0.9649

PGI1 56 5 0.4528 0.2000 0.8673 0.4449 0.0198 0.2506 0.8004

PGI2 56 3 0.4968 0.3333 0.9311 0.6334 0.0292 0.3648 0.9305

PGI3 56 2 0.5918 0.5000 0.9649 0.7895 0.0277 0.5026 0.9649

PER1 56 3 0.5325 0.3333 0.9311 0.6400 0.0296 0.3667 0.9305

MDH1 56 3 0.4866 0.3333 0.9311 0.6331 0.0296 0.3616 0.9305

=================================================================

**Cont. Table S5** Neutrality tests

Population Name: LD, Bustingorry

=================================================================

Locus n k Obs. F Min F Max F Mean\* SE\* L95\* U95\*

=================================================================

ME1 56 3 0.6295 0.3333 0.9311 0.6421 0.0297 0.3648 0.9305

SKDH 56 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

IDH 56 2 0.7302 0.5000 0.9649 0.7801 0.0268 0.5026 0.9649

MNR 56 2 0.5772 0.5000 0.9649 0.7906 0.0252 0.5026 0.9649

PERcat 56 1 1.0000 1.0000 1.0000 \*\*\*\* \*\*\*\* \*\*\*\* \*\*\*\*

PGI1 56 2 0.5102 0.5000 0.9649 0.7840 0.0269 0.5026 0.9649

PGI2 56 3 0.4968 0.3333 0.9311 0.6403 0.0292 0.3648 0.9305

PGI3 56 2 0.5918 0.5000 0.9649 0.7839 0.0280 0.5026 0.9649

PER1 56 3 0.4063 0.3333 0.9311 0.6362 0.0296 0.3693 0.9305

MDH1 56 2 0.6633 0.5000 0.9649 0.7800 0.0281 0.5006 0.9649

=================================================================

**Figure S1** Bivariate relation between browsing index, dung density, plant cover, plant richness and stocking rate in 10 paddocks in Monte desert rangelands.

**Figure S2** Average variation parameters for *Larrea sps.* individuals that contribute more than 50 relative weight factor (RWF) to the next generation in orange, and for individuals that contribute less than 50 RWF to the next generation in blue. Height: Plant height, Browsing: Proportion of browsed branches, Rep.: Proportion of reproductive individuals, AE: Mean number of alleles per locus. Error bars represent SD.

**Figure S3** UPGMA of Nei´s genetic distance for *Larrea sps.* from ten paddocks in Monte Desert. Terminal OTUS are paddocks and stocking level in brackets, L: Low, I: Intermediate, H: High. Mangrullo (MA), Bustingorri (Bu), Campo1 (C1), Campo A (CA) Guevara (G) Bustamante(Bt) M. Avila(AMO) D. Avila (ADA) H. López(HL) M. Arriba (Maarr).

**0**

**0.025**

**0.05**

**0.075**

**0.1**

**0.125**

**0.15**

**0.175**

**0.2**

**C1 (I)**

**Bu (L)**

**AMO (H)**

**CA (I)**

**CA (I)**

**G (I)**

**G (I)**

**MA (L)**

**Bt (I)**

**ADA (H)**

**C1 (I)**

**AMO (H)**

**HL (H)**

**MA (L)**

**ADA (H)**

**Bt (I)**

**Maarr (H)**

**Bu (L)**