

SUPPORTING INFORMATION FOR:

**SIGNS OF LOCAL ADAPTATION AND PHENOTYPIC PLASTIC RESPONSE TO  
ELEVATION SHIFTED BETWEEN LIGHT AND SHADE IN SNAPDRAGON PLANTS**

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## 1 SUPPLEMENTARY MATERIAL

### 1.1 *Supplementary Informations*

ENVIRONMENTAL CONDITIONS IN PLANTING SITES — Temperature (°C), Relative Humidity (%) and Light intensity (lux) were measured during the experiment at each garden site and environment using external data loggers (HOBO U12-012) with one measure per hour. Photosynthetically Active Radiation (PAR) and spectral data were measured at each planting site and environment in cloud-free conditions, to minimize the external effects of the atmospheric conditions, using a fiber-optic spectrometer (AvaSpec-2048; Avantes, Netherlands). The sensor's field of view was 25°, with a full sky irradiance remote cosine corrector. Spectral data was measured at wavelengths ranging from 400 nm to 1000 nm at 0.6 nm intervals and flux densities of PAR were measured at 60 s intervals every 15 days from 10 am to 2 pm during the experiment. The mean of each type of these light measurement were obtained for each site and environment. The red:far-red (R/FR) ratio was calculated from the spectral data (photon flux between 655 and 665 nm divided by photon flux between 725 and 735 nm).

Meteorological variables and light availability were compared between planting sites, in different environment, using linear mixed-effects models. Daily average of Temperature, Relative Humidity and Light intensity were compared with planting site as a fixed effect and days as a random effect. A difference between sites for PAR and spectral data averages were determined with planting sites as a fixed effect and hours or wavelengths as a random effect.

1.2 *Supplementary Table*TABLE S1: Description of *Anthirinum majus* populations grown in the two common garden experiments. Nfam= number of families, N= number of plants.

| Acronym | Latitude | Longitude | Location                 | Altitude (m) | Subspecies  | Description                               | Origin | Nfam | Nseed |
|---------|----------|-----------|--------------------------|--------------|-------------|-------------------------------------------|--------|------|-------|
| BAG     | 43.10    | 2.98      | Bages                    | 6            | pseudomajus | Dunes on seaside (rocky / herbaceous)     | Low    | 15   | 354   |
| BAN     | 42.49    | 3.12      | Banyuls-sur-Mer          | 61           | pseudomajus | Rockside bank (rocky)                     | Low    | 15   | 360   |
| BES     | 42.21    | 2.67      | Besalú                   | 195          | pseudomajus | Stone walls in village                    | Low    | 15   | 363   |
| CAL     | 42.10    | 1.83      | Berga                    | 838          | pseudomajus | Roadside bank (herbaceous)                | High   | 15   | 361   |
| LAG     | 43.09    | 2.58      | Lagrasse                 | 149          | pseudomajus | Roadside bank (rocky / herbaceous)        | Low    | 15   | 361   |
| LUC     | 42.97    | 2.26      | Luc-sur-Aude             | 227          | striatum    | Roadside bank and river-side bank (rocky) | Low    | 15   | 361   |
| LYS     | 42.83    | 2.20      | 'Pierre-Lys' gorge       | 713          | striatum    | Roadside bank (rocky / herbaceous)        | Low    | 15   | 361   |
| MAR     | 42.55    | 2.62      | Saint-Marsal             | 628          | striatum    | Roadside bank (rocky / herbaceous)        | Low    | 15   | 360   |
| MIJ     | 42.73    | 2.04      | Mijanès                  | 1347         | striatum    | Roadside bank (herbaceous)                | High   | 13   | 312   |
| MON     | 42.51    | 2.12      | Mont-Louis citadelle     | 1564         | striatum    | Stone walls on fortifications             | High   | 15   | 363   |
| PAR     | 42.31    | 2.20      | Pardines                 | 1118         | pseudomajus | Roadside bank (herbaceous)                | High   | 15   | 360   |
| RIP     | 42.21    | 2.20      | Ripoll                   | 709          | pseudomajus | Roadside bank (herbaceous)                | Low    | 15   | 360   |
| SAL     | 42.23    | 1.74      | Salades                  | 1126         | pseudomajus | Banks in pasture (herbaceous)             | High   | 15   | 361   |
| THU     | 42.64    | 2.72      | Thuir                    | 130          | striatum    | Roadside bank (herbaceous)                | Low    | 15   | 362   |
| VIL     | 42.59    | 2.48      | Villefranche-de-Conflent | 568          | striatum    | Bank (rocky and shrubs)                   | Low    | 15   | 361   |

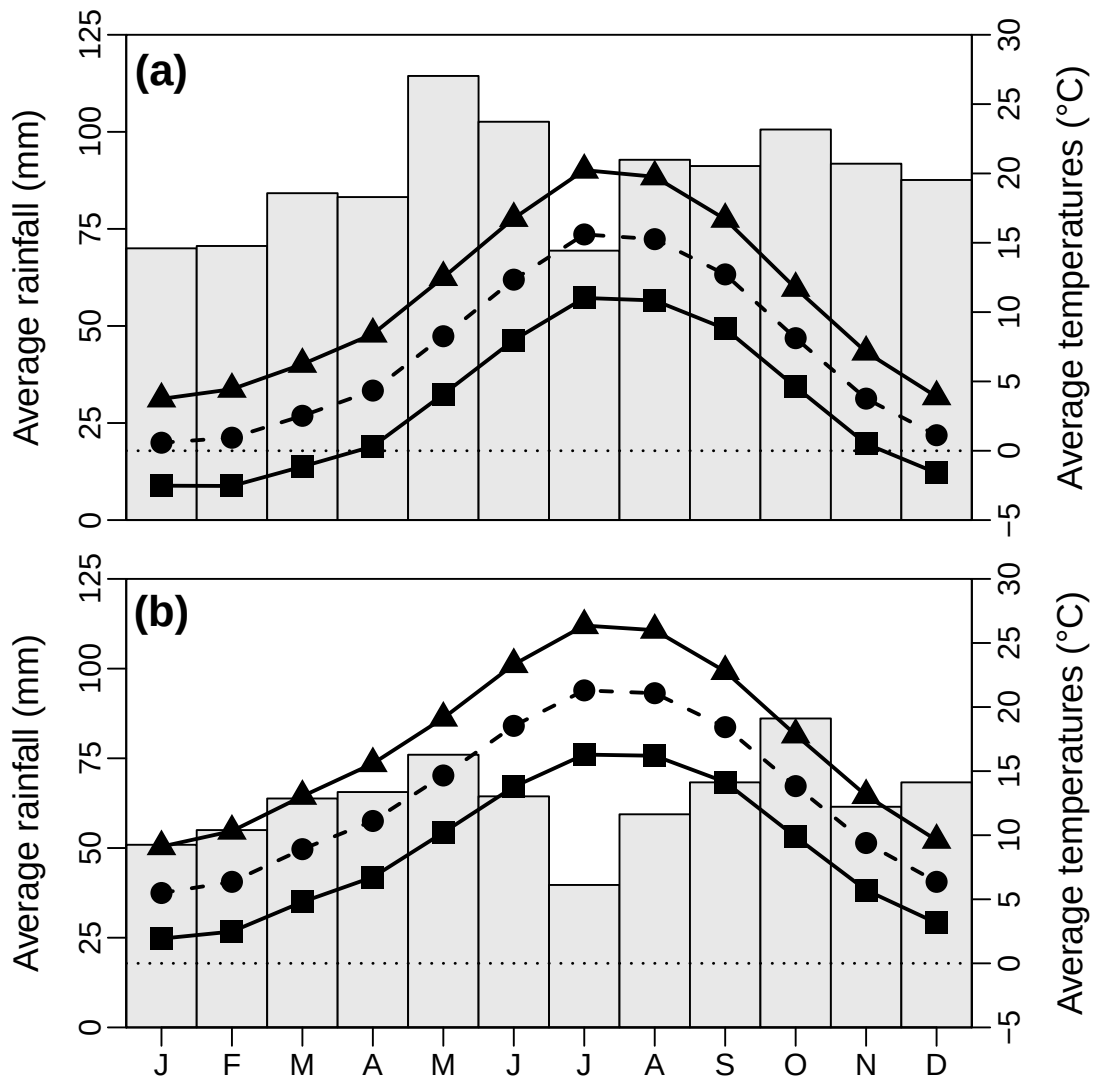
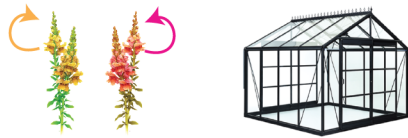
1.3 *Supplementary Figures*

FIGURE S1: Environmental conditions recorded monthly over a year at a) high-elevation and b) low-elevation sites. Histograms represent average rainfall, and lines average (dot points), minimum (square) and maximum (triangle) temperatures



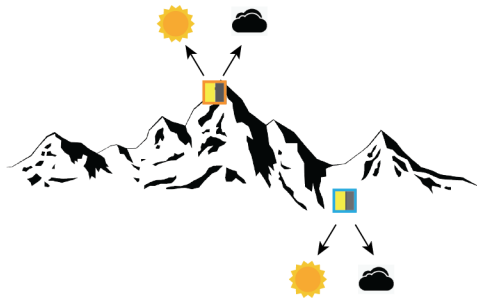
**1. Seed collection:**

Seeds of *A. m. pseudomajus* and *A. m. striatum* collected from high- and low-elevation populations in the Pyrennes



**2. Seed production under control conditions:**

two generations of plants were generated via controlled-crosses to reduce maternal effects



**3. Seeds transplantation  
in four common gardens:**

at two elevation sites (**high** vs **low**) and under two light treatments (**light** and **shade**)

FIGURE S2: Schema of the experimental design.

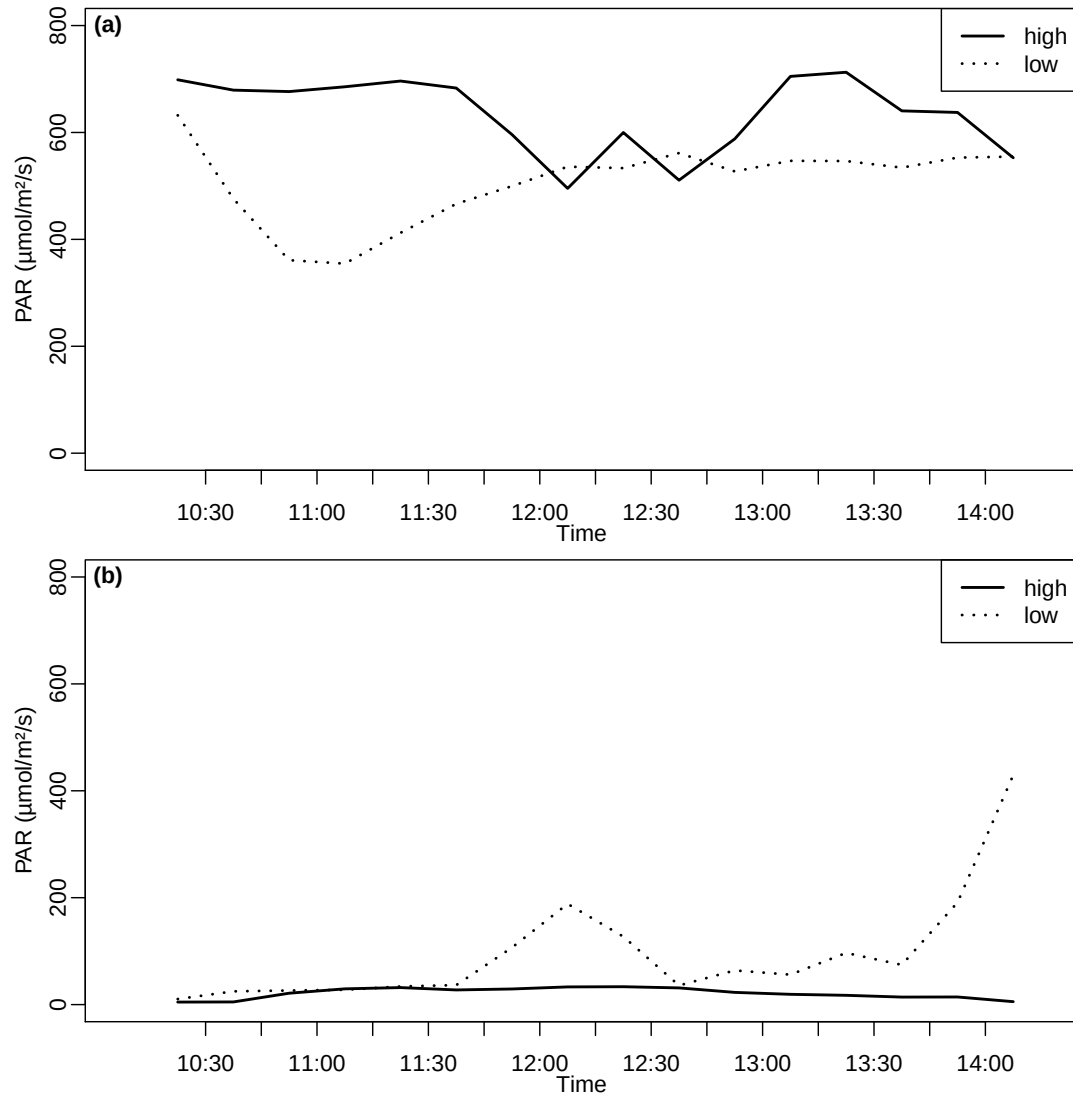


FIGURE S3: Difference in photosynthetically active radiation (PAR) between high and low-elevation sites in a) open habitat light, and b) understory shade treatments.

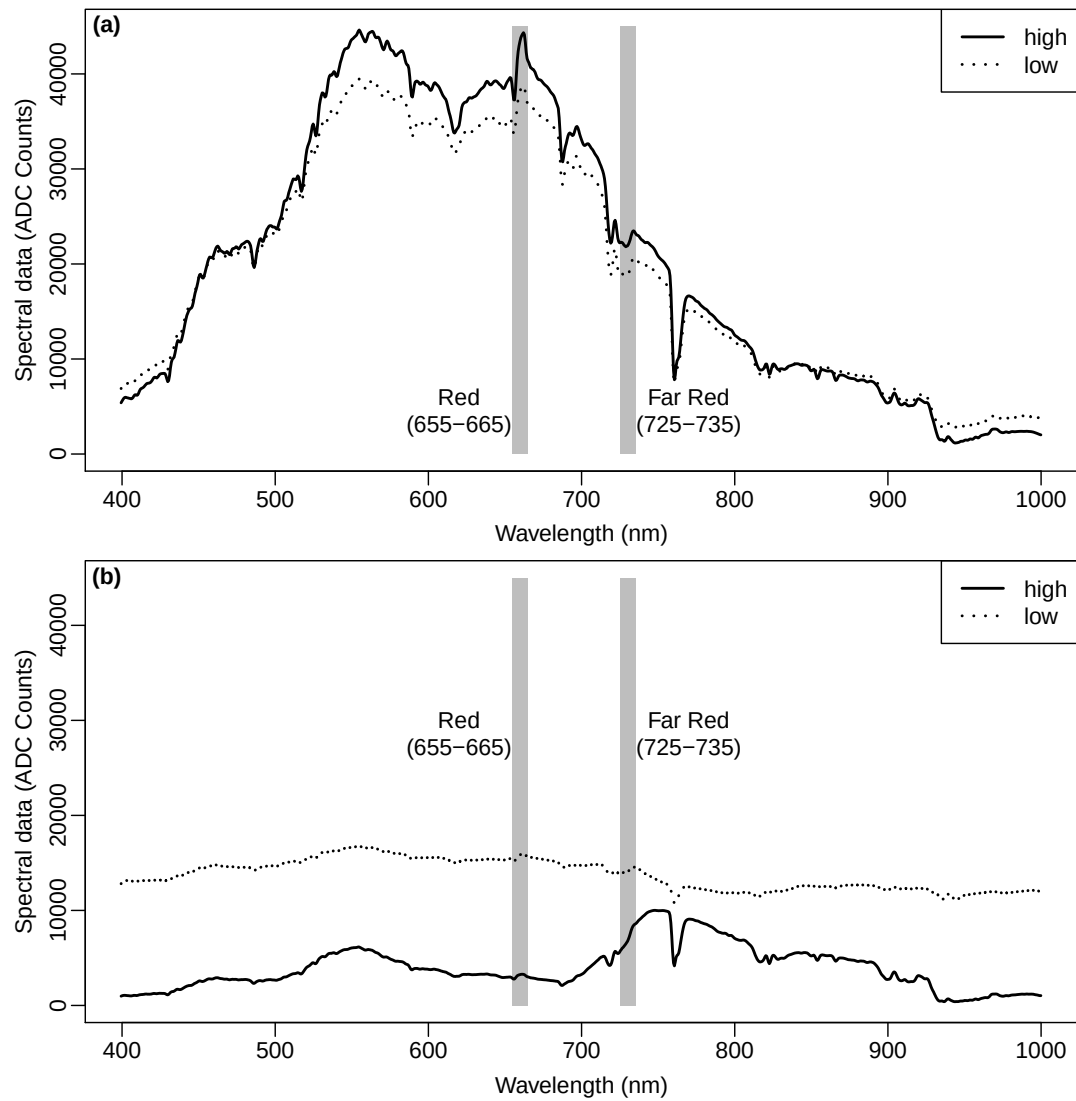


FIGURE S4: Differences in spectral data between high and low-elevation sites in a) open habitat light, and b) understory shade treatments.

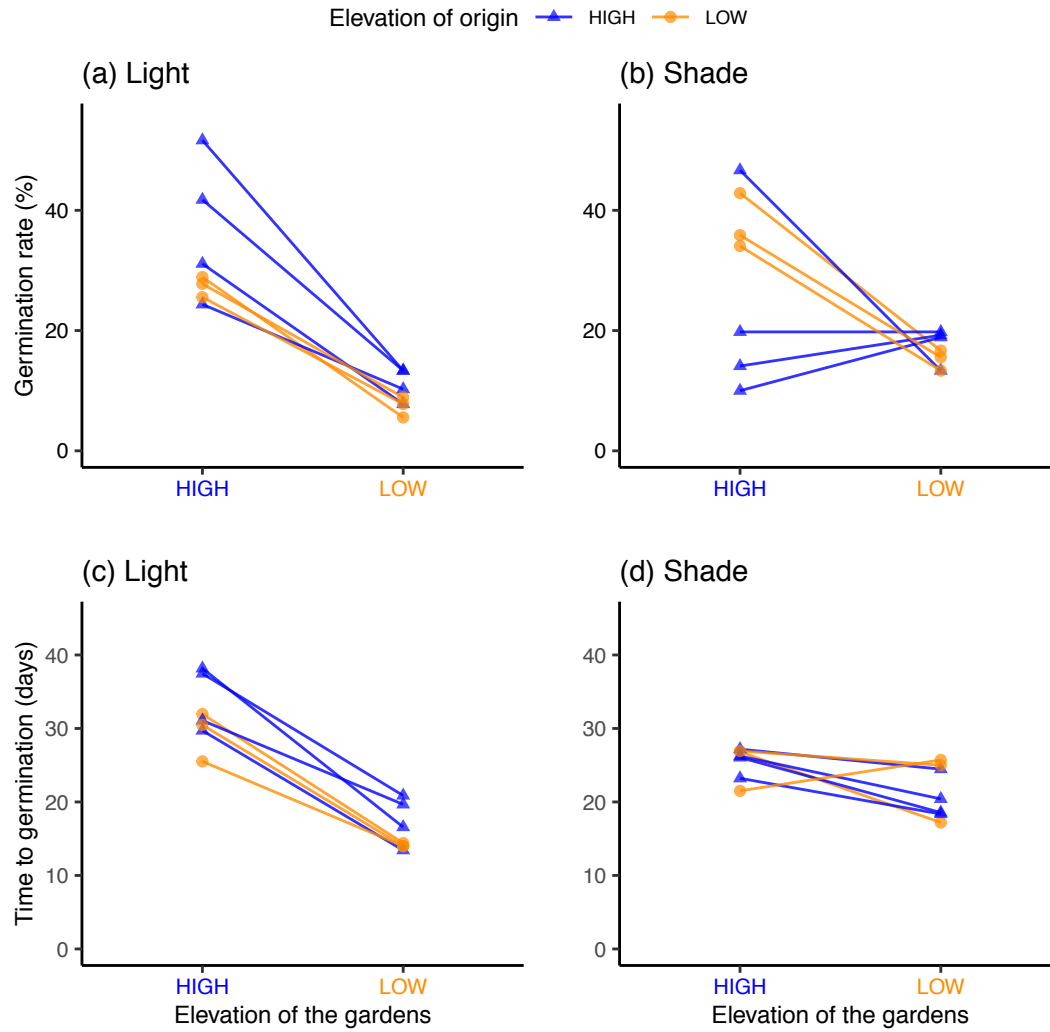


FIGURE S5: Reaction norms of germination-related traits (mean values  $\pm$  95% CI) for seven populations of *Anthirrinum majus striatum* in the two sites (low and high elevations) and under two treatments (open light habitat and undertory shade). plots a) and b) refer to germination rate, c) and d) to time to germination, a) and c) refer to light treatment, b) and d) to shade treatment. Significant differences are indicated by asterisks. \*\*\*:  $p\text{-value} \leq 0.001$ , \*\*:  $0.001 < p\text{-value} \leq 0.01$ , \*:  $0.01 < p\text{-value} \leq 0.05$ , ".":  $0.05 < p\text{-value} < 0.1$ , ns"ns":  $p\text{-value} \geq 0.1$ .

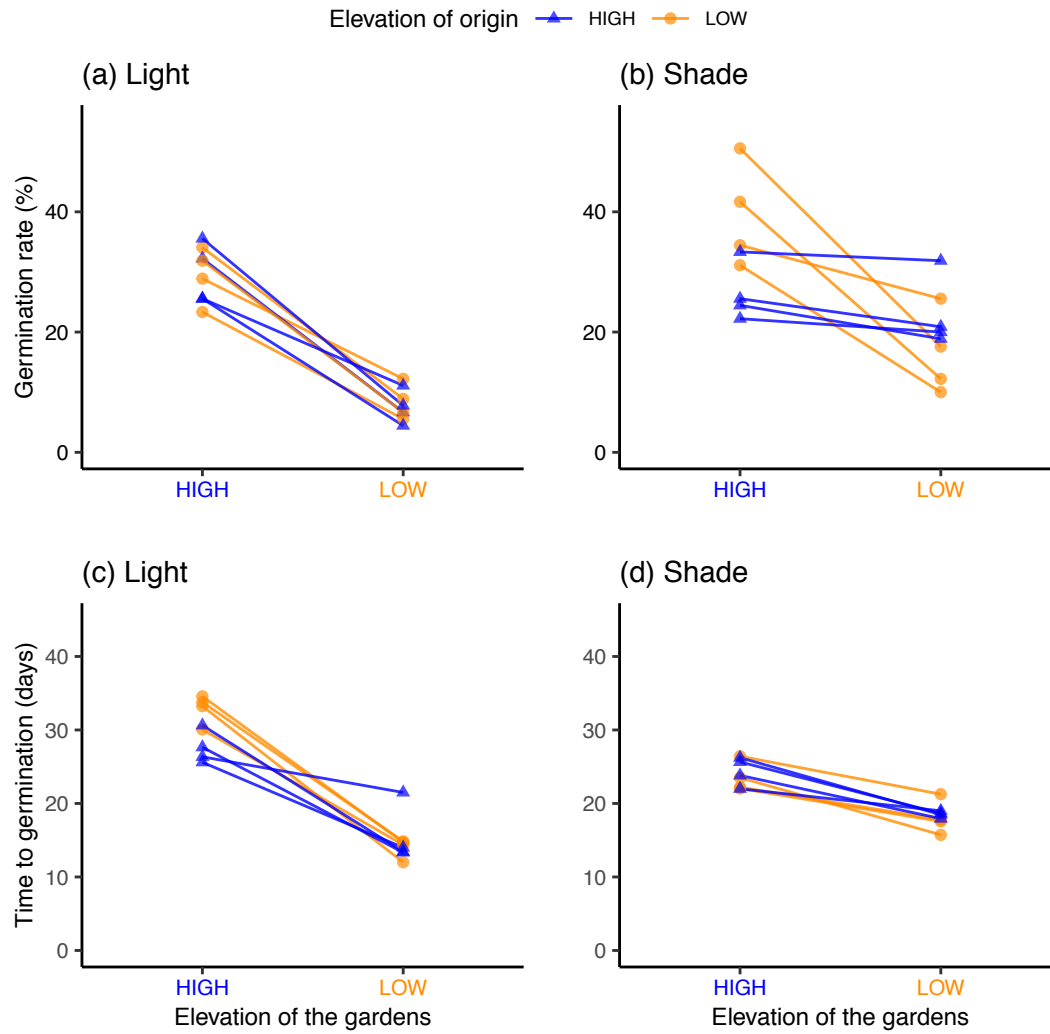


FIGURE S6: Reaction norms of germination-related traits for eight populations of *Anthirrinum majus pseudomajus* in the two sites (low and high elevations) and under two treatments (open light habitat and undertory shade). plots a) and b) refer to germination rate, c) and d) to time to germination, a) and c) refer to light treatment, b) and d) to shade treatment. Significant differences are indicated by asterisks. \*\*\*:  $p.value \leq 0.001$ , \*\*:  $0.001 < p.value \leq 0.01$ , \*:  $0.01 < p.value \leq 0.05$ , ".":  $0.05 < p.value < 0.1$ , "ns":  $p.value \geq 0.1$ .