README

For data of “Correlations among developmental stability, canalization and phenotypic plasticity in response to population density in leaf size of *Abutilon theophrasti*”

*Experimental Design*

The experiment used a split plot design, with infertile and fertile soil conditions assigned as two whole plots, each of which was divided into nine 2 × 3 m sub-plots, with three plant densities and three blocks randomly distributed. Low, medium and high densities were set up by sowing seeds at three inter-planting distances of 30, 20 and 10 cm, to reach the target plant densities of 12.8, 27.5 and 108.5 plants·m-2 respectively. Contrasting soil conditions were set up by using the soil of experimental plots as infertile soil, in comparison with covering a layer of more-fertile soil on the plots as fertile soil [14](#_ENREF_14).

*Data collection and analysis*

Plants were harvested at 30, 50 and 70 days of growth from emergence. At each of three stages, five to six individuals were randomly chosen from each plot, making the maximum total of 6 replicates × 3 blocks × 3 densities × 2 soils × 3 stages = 324 sampling. For each individual in each treatment, the widths of right and left sides per leaf were measured twice with a digital caliper for all leaves on the main stem, to calculate leaf size (LS, the average width of right and left sides) and leaf fluctuating asymmetry (FA). We attempted to apply almost all kinds of indexes (FA1-FA8 and FA10) to calculate leaf FA as an estimate of developmental stability [20](#_ENREF_20),[49](" \l "_ENREF_49" \o "Palmer, 1986 #2489). Results from ANOVA analyses indicated similar conclusions from most of the indexes. We adopted three of FA1, FA2 and FA10 from all indexes, as FA1 and FA2 are ones with and without effects of leaf size respectively, and FA10 is the only index with measurement error variance partitioned out of the total between-sides variance, with formulas as follows [20](#_ENREF_20),[49](#_ENREF_49):

FA1 = ∑│*R* - *L*│/*n* (1-1)

FA2 = ∑[(*R* - *L*)/*LS*]/*n* (1-2)

FA10 = *0.798* × √ (*MSsj*- *MSm*) / *M* (1-3)

where *R* and *L* were the widths of right and left sides of a leaf, *n* was the total number of leaves, and *LS* (leaf size) was calculated by (*R*+*L*)/*2*, *MSsj*was the mean squares of side × individual interaction, *MSm* was the mean squares of measurement error, *M* was the number of replicate measurements per side, from a side × individual ANOVA on untransformed replicate measurements of *R* and *L*.

Developmental canalization in leaf size was evaluated by coefficient of variation (CV, the standard deviation divided by mean value of the trait), including among-leaf CV (CVleaf) and among-individual CV (CVin).

Plasticity in leaf size was calculated with the formula of simplified Relative Distance Plasticity Index (RDPIs)[50](" \l "_ENREF_50" \o "Valladares, 2006 #547). We abbreviated RDPIs to PI for convenience, and we also calculated the degree of plasticity in leaf size as absolute plasticity (PIabs), corresponding to its relative plasticity (PIrel):

PIrel ­= (*X*– *Y*)/(*X* + *Y*) (2-1)

PIabs ­= | (*X*– *Y*)/(*X* + *Y*) | (2-2)

where *X*was the adjusted mean leaf size at high or medium density, and *Y* was the adjusted mean leaf size at low density. Therefore, plasticity indexes included those in response to high vs. low density (PIrel-HL and PIabs-HL) and in response to medium vs. low density (PIrel-ML and PIabs-ML).

All variables for traits were used in statistics, and the original data was log-transformed, petiole angles were square root-transformed, before any analysis to minimize variance heterogeneity. All analyses were conducted using SAS statistical software (SAS Institute 9.0 Inc. 2002). Three-way ANOVA was performed for overall effects of growth stage, soil conditions, population density and their interactions on all variables. Then we used one-way ANOVA for effects of density on all variables in each soil conditions at each stage and across all soils and stages. Multiple comparisons used LSD method in General Linear Model (GLM) program. For each of and across all treatments, correlations among all variables were analyzed with PROC CORR, producing Pearson Correlation Coefficients (PCC) for all correlations and Partial Pearson Correlation Coefficients (PPCC) for correlations among leaf FAs, CVs and PIs, with leaf size as covariate in partial correlation analyses.

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