Bateman and Nielsen: Supplementary Tables.

**Table S1.** Summary of transformations performed on variables in the analysis done to conform to normality assumptions in SEM.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variable Type** | **Variable Name** | **Skew** | **Transformation** | **Royston V`** |
|  |  |  |  |  |
| Exogenous | Female Density | Right | Logarithmic | 0.38 |
| Male Density | Right | Logarithmic | 0.41 |
| All Density | Right | Logarithmic | 0.70 |
| Canopy | Left | Square | 3.09 |
| Average Height | None | None | 0.82 |
| Endogenous | Flower Production per cm | Right | Logarithmic | 0.87 |
| Fruit Production Per cm | Right | Logarithmic | 1.27 |
| Total Fruit Production | Right | Logarithmic | 0.90 |

**Table S2.** Variable transformations for each parameter assessed in the structural equation model for *S. canadensis* fruit production in Central Alberta, Canada, showing tests conducted for each variable and the corresponding Shapiro–Francia W`, Royston V`, z, and p value.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable** | **Transformation** | **Shapiro-Francia W`** | **Royston V`** | **z** | **Prob>z** |
|  |  |  |  |  |  |
| Female Density | Untransformed | 0.88 | 7.02 | 3.73 | 0 |
| Female Density | Logarithmic | 0.99 | 0.38 | –1.84 | 0.97 |
| Male Density | Untransformed | 0.91 | 5.47 | 3.25 | 0 |
| Male Density | Logarithmic | 0.99 | 0.41 | –1.69 | 0.95 |
| All Density | Untransformed | 0.83 | 10.16 | 4.43 | 0 |
| All Density | Logarithmic | 0.99 | 0.698 | –0.69 | 0.75 |
| Canopy | Untransformed | 0.87 | 7.8 | 3.93 | 0 |
| Canopy | Square | 0.95 | 3.09 | 2.16 | 0.02 |
| Canopy | Cubic | 0.97 | 1.58 | 0.87 | 0.19 |
| Canopy | Arcsine | 0.88 | 7.11 | 3.75 | 0 |
| Size (average height) | Untransformed | 0.99 | 0.82 | –0.37 | 0.65 |
| Size (average height) | Logarithmic | 0.98 | 0.99 | –0.02 | 0.51 |
| Flower Production per cm | Untransformed | 0.96 | 2.38 | 1.66 | 0.05 |
| Flower Production per cm | Logarithmic | 0.99 | 0.89 | -0.23 | 0.59 |
| Fruit Production per cm | Untransformed | 0.94 | 3.79 | 2.55 | 0.01 |
| Fruit Production per cm | Logarithmic | 0.98 | 1.27 | 0.45 | 0.32 |
| Fruit Production | Untransformed | 0.85 | 8.86 | 4.17 | 0 |
| Fruit Production | Logarithmic | 0.98 | 0.9 | –0.19 | 0.58 |

1 Canopy is the single variable where a transformation of a higher Royston V` was used than available; the cubic transformation was not used because it caused complications in the SEM calculations and did not change the basic analysis results.

**Table S3**. Meaning of normality statistics (sfrancia). Derived by the authors.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Statistic** | **Value of Statistic** | | | | | | | | |
| –3 | –0.5 | 0 | 0.25 | 0.75 | 0.95 | 1 | 1.5 | ≥2.5 |
| Shapiro-Francia’s W` | Not applicable | Not applicable | Not applicable | Not applicable | Not applicable | Not normal | Normal | Not applicable | Not applicable |
| Royston’s V` | Not applicable | Not applicable | Normal | Highly normal | Moderately normal | Moderately normal | Weakly normal | Weakly normal | Not normal |
| z | Normal | Moderately Normal | Moderately normal | Moderately normal | Weakly normal | Weakly normal | Weakly Normal | Weakly Normal | Not normal |
| Prob>z | Not applicable | Not applicable | Not normal | Weakly Normal | Moderately Normal | Moderately normal | Normal | Not applicable | Not applicable |

**Table S4**. Direct and indirect path relationships (hypotheses) and their coefficients (β) from a path model relating flower and fruit per cm of branch for a population of Shepherdia canadensis in Edmonton, Alberta, Canada.1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Path factor** | **Path** | **β** | **SE** | **z** | ***P*** |
| Canopy cover, direct effect (βFrcmC) | C–>Frcm | –0.24 | 0.1 | –2.45 | 0.014 |
| Canopy cover, direct effect (βFlC) | C–>Fl | –0.29 | 0.11 | –2.63 | 0.009 |
| Canopy cover, indirect effect (βFrcmFlC) | C–>Fl \* Fl–>Frcm | –0.15 | 0.06 | –2.42 | 0.016 |
| Canopy cover, total effect (βC(total)Frcm) | C–>Fl–>Frcm + C–>Frcm | –0.40 | 0.1 | –3.83 | <0.001 |
| Density dependence, direct effect (βFlD) | D–>Fl | 0.32 | 0.11 | 3.01 | 0.003 |
| Density dependence, indirect effect (βFrcmFlD) | D–>Fl \* Fl–>Frcm | 0.17 | 0.07 | 2.6 | 0.009 |
| Internal constraints, direct effect (βFrcmFl) | Fl–>Frcm | 0.54 | 0.09 | 6.03 | <0.001 |
| Internal constraints, direct effect (βFrcmS) | S–>Frcm | 0.037 | 0.1 | 0.38 | 0.707 |
| Pollen competitor, direct effect (βFrF) | F–>Frcm | –0.28 | 0.11 | –2.46 | 0.014 |
| Pollen donor, direct effect (βFrcmM) | M–>Frcm | 0.37 | 0.11 | 3.25 | 0.001 |
| Error | e.Fl–>Fl | 0.8 | 0.09 | – | – |
| Error | e.Frcm–>Frcm | 0.54 | 0.09 | – | – |

1 Coefficients are in standardized units. Path abbreviations are as follows: C–Canopy cover; Frcm–Fruit per centimeter (fruit production per centimeter on sub-sampled branches); Fl–Flower production (flower production per centimeter on sub-sampled branches); D–total intraspecific buffaloberry density surrounding the focal plant (individuals in 50 m2 plot surrounding focal female plant); M–Male buffaloberry density surrounding the focal plant; F–Female buffaloberry density surrounding the focal plant; S–Focal plant size (height); e–Error term displaying degree of unexplained variance for endogenous variables.