**Supplementary Material** to the paper Sebastián R. Zeballos\*, Paula Venier, Mariana Pereyra; Denise Simian and Guillermo Funes. *Germination niche of a pioneer woody species (Manihot grahamii Hook.): a seed heat stimulation strategy to cope with disturbance in dry subtropical forests*. \*, Corresponding author: sebazeba@hotmail.com

**Supplementary material Table S1.** Generalized linear model results for the effects of alternating temperatures (15/5 ºC, 25/15 ºC and 35/20 ºC) and light conditions (light and darkness) on the germination of freshly collected seeds (i.e., hereafter control) of *Manihot grahamii*.

|  |  |  |
| --- | --- | --- |
| Source of variation | df | LR Chisq |
| Alternating temperatures (AT) | 2 | 121.293\*\*\* |
| Light conditions (L) | 1 | 98.615\*\*\* |
| AT \* L | 2 | 3.857NS |

\*\*\* P = 0.001; NS, no significant difference.

**Supplementary material Table S2.** Generalized linear model results for the effects of the Gibberellic acid (GA3) seed pre-treatment, alternating temperatures (15/5 ºC, 25/15 ºC and 35/20 ºC) and light conditions (light and darkness) on *Manihot grahamii* germination. Control was included as a level factor in GLM analysis within GA3 seed pre-treatment.

|  |  |  |
| --- | --- | --- |
| Source of variation | df | LR Chisq |
| Seed pre-treatment (SP) | 1 | 27.52\*\*\* |
| Alternating temperatures (AT) | 2 | 178.734\*\*\* |
| Light conditions (L) | 1 | 129.81\*\*\* |
| SP \* AT | 2 | 0.777NS |
| SP \* L | 1 | 3.186NS |
| AT \* L | 2 | 5.734NS |
| SP \* L \* AT | 2 | 0.331NS |

\*\*\* P = 0.001; NS, no significant difference.

**Supplementary material Table 3.** Generalized linear model results for the effects of the After ripening seed pre-treatment and alternating temperatures (15/5ºC, 25/15ºC and 35/20ºC) on *Manihot grahamii* germination. Control was included as a level factor in GLM analysis within After ripening seed pre-treatment.

|  |  |  |
| --- | --- | --- |
| Source of variation | df | LR Chisq |
| Seed pre-treatment (SP) | 1 | 10.3821\*\* |
| Alternating temperatures (AT) | 2 | 29.0812\*\*\* |
| SP \* AT | 2 | 0.8733NS |

\*\*\* P = 0.001; \*\* P = 0.01. NS, no significant difference.

**Supplementary material S1 Table 4.** Generalized linear model results for the effects of the Dry prechilling seed pre-treatment, alternating temperatures (15/5ºC, 25/15ºC and 35/20ºC) and light conditions (light and darkness) on *Manihot grahamii* germination. Control was included as a level factor in GLM analysis within Dry prechilling seed pre-treatment.

|  |  |  |
| --- | --- | --- |
| Source of variation | df | LR Chisq |
| Seed pre-treatment (SP) | 1 | 18.237\*\*\* |
| Alternating temperatures (AT) | 2 | 273.729\*\*\* |
| Light conditions (L) | 1 | 107.483\*\*\* |
| SP \* AT | 2 | 3.531NS |
| SP \* L | 1 | 18.895\*\*\* |
| AT \* L | 2 | 5.639NS |
| SP \* L \* AT | 2 | 1.716NS |

\*\*\* P = 0.001; NS, no significant difference.

**Supplementary Material Table 5.** Generalized linear model results for the effects of the Dry prechilling + warm pre-treatment, alternating temperatures (15/5 ºC, 25/15 ºC and 35/20 ºC) and light conditions (light and darkness) on *Manihot grahamii* germination. Control was included as a level factor in GLM analysis within Dry prechilling + warm seed pre-treatment.

|  |  |  |
| --- | --- | --- |
| Source of variation | df | LR Chisq |
| Seed pre-treatment (SP) | 1 | 124.18\*\*\* |
| Alternating temperatures (AT) | 2 | 411.53\*\*\* |
| Light conditions (L) | 1 | 125.04\*\*\* |
| SP \* AT | 2 | 9.77\*\* |
| SP \* L | 1 | 24.55\*\*\* |
| AT \* L | 2 | 15.05\*\*\* |
| SP \* L \* AT | 2 | 3.35NS |

\*\*\* P = 0.001; \*\* P = 0.01; NS, no significant difference.

**Supplementary Material Table 6.** Generalized linear model results for the effects of the Heat shock seed pre-treatment, alternating temperatures (15/5 ºC, 25/15 ºC and 35/20 ºC) and light conditions (light and darkness) on *Manihot grahamii* germination. Control was included as a level factor in GLM analysis within Heat shock seed pre-treatment.

|  |  |  |
| --- | --- | --- |
| Source of variation | df | LR Chisq |
| Seed pre-treatment (SP) | 3 | 334.12\*\*\* |
| Thermo-period (AT) | 2 | 640.62\*\*\* |
| Light conditions (L) | 1 | 108.86\*\*\* |
| SP \* AT | 6 | 31.75\*\*\* |
| SP \* L | 3 | 73.91\*\*\* |
| AT \* L | 2 | 71.76\*\*\* |
| SP \* L \* AT | 6 | 16.54\* |

\*\*\* P = 0.001; \* P = 0.05; NS, no significant difference.

**Supplementary Material Table 7.** Generalized linear model results for the effects of the Gap temperature seed pre-treatment, alternating temperatures (15/5 ºC, 25/15 ºC and 35/20 ºC) and light conditions (light and darkness) on *Manihot grahamii* germination. Control was included as a level factor in GLM analysis within Gap temperature seed pre-treatment.

|  |  |  |
| --- | --- | --- |
| Source of variation | df | LR Chisq |
| Seed pre-treatment (SP) | 1 | 71.78\*\*\* |
| Alternating temperatures (AT) | 2 | 459.24\*\*\* |
| Light conditions (L) | 1 | 132.21\*\*\* |
| AT \* T | 2 | 9.79\*\* |
| AT \* L | 1 | 43.33\*\*\* |
| AT \* L | 2 | 28.69\*\*\* |
| SP \* L \* AT | 2 | 6.37\* |

\*\*\* P = 0.001; \*\* P = 0.01; \* P = 0.05; NS, no significant difference.