Supplementary Information: comparisons of baseline characteristics of seedling plots chosen for fenced and ungulate treatments.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Site | trt | adult trees | avg dbh (cm) | canopy cover | avg height (m) |
| Ritidian Grid | fenced | 6 | 14.67 | 0.82 | 9.17 |
| Ritidian Gate | fenced | 7 | 14.57 | 0.9 | 8.71 |
| Anao North | fenced | 6 | 10.00 | 0.84 | 10.60 |
| Anao South | fenced | 7 | 12.00 | 0.73 | 9.43 |
| North Blas | fenced | 13 | 8.23 | 0.85 | 7.62 |
| South Blas | fenced | 8 | 6.13 | 0.76 | 6.88 |
| Racetrack | fenced | 14 | 4.93 | 0.9 | 6.21 |
| Racetrack Fragment | fenced | 12 | 4.00 | 0.88 | 7.46 |
| Ritidian Grid | ungulate | 5 | 16.20 | 0.84 | 8.30 |
| Ritidian Gate | ungulate | 5 | 11.20 | 0.85 | 7.60 |
| Anao North | ungulate | 8 | 19.00 | 0.84 | 11.06 |
| Anao South | ungulate | 11 | 6.45 | 0.79 | 9.43 |
| North Blas | ungulate | 6 | 4.75 | 0.82 | 7.75 |
| South Blas | ungulate | 6 | 6.67 | 0.74 | 7.67 |
| Racetrack | ungulate | 10 | 4.93 | 0.9 | 6.65 |
| Racetrack Fragment | ungulate | 9 | 4.00 | 0.89 | 6.67 |

We used paired t-tests in R to assess if # of adult trees and proportion canopy cover differed significantly between treatments, results are below:

t.test(adult.trees ~ trt, avg, paired = TRUE)

results

t = 1.3439, df = 7, p-value = 0.2209

95 percent confidence interval:

-1.234195 4.484195

sample estimates:

mean of the differences

🡪number of adult trees between treatments are not significantly different

t.test(canopy.cover ~ trt, avg, paired = TRUE)

results

t = 0.10533, df = 7, p-value = 0.9191

95 percent confidence interval:

-0.02681324 0.02931324

sample estimates:

mean of the differences

0.00125

🡪 canopy cover does not differ significantly between plots

Since the number of adult trees was different between each site, instead of using t-tests to determine if DBH and heights were significantly different, we used an lsmeans approach. Results are presented below, and strongly suggest that DBH and height of adult trees did not differ between treatments plots. Therefore, our results in the manuscript of differences based on treatment effects for each species of planted seedlings do not appear to be due to inherent characteristics of the sites.

For height:

Trt lsmean SE df lower.CL upper.CL

Fenced 8.142399 0.3627278 119 7.424162 8.860637

Ungulate 8.041525 0.3883915 119 7.272471 8.810579

Results are averaged over the levels of: Site

Confidence level used: 0.95

contrast estimate SE df t.ratio p.value

Fenced - Ungulate 0.1008746 0.5314315 119 0.19 0.8498

For DBH:

Trt lsmean SE df lower.CL upper.CL

Fenced 9.315304 0.5696335 119 8.187373 10.44324

Ungulate 9.083902 0.6099361 119 7.876167 10.29164

Results are averaged over the levels of: Site

Confidence level used: 0.95

contrast estimate SE df t.ratio p.value

Fenced - Ungulate 0.231403 0.8345684 119 0.277 0.7821

In addition, we included qualitative descriptions of the sites in the table below.

|  |  |  |  |
| --- | --- | --- | --- |
| Site |  | Fenced | Unfenced/Ungulate |
| Ritidian Grid | Substrate | Solid karst formations in southeast corner of plot, large amounts of *Ochrosia oppositifolia* leaf litter | Mostly flat with scattered limestone rocks 10-20 cm in diameter, mixed leaf litter |
|  | Slope | 0 | 0 |
|  | Species of adult trees | *Ochrosia oppositifolia, Aglaia mariannensis, Meiogyne cylindrocarpa* | *Ochrosia oppositifolia, Psychotria mariana, Cycas micronesica* |
| Ritidian Gate | Substrate | Mostly 5-10cm-diameter rocks with few large, 50-cm-high boulders, <20% exposed red soil | Few large, 50-cm-high boulders, <20% exposed red soil, mostly 5-10cm-diameter rocks |
|  | Slope | 0 | slight downward slope (<5 degrees) towards NW |
|  | Species of adult trees | *Ochrosia oppositifolia, Algaia mariannensis, Triphasia trifolia* | *Aglaia mariannensis, Mammea odorata, Ochrosia oppositifolia* |
| Anao North | Substrate | very rocky, no soil visible, rocks from 5 - 50-cm in diameter | very rocky, no soil visible, rocks from 5 - 50-cm in diameter |
|  | Slope | 0 | 0 |
|  | Species of adult trees | *Ochrosia oppositifolia, Meiogyne cylindrocarpa* (*Macaranga thompsonii,* out of plot, but canopy overhanging plot) | *Ochrosia oppositifolia, Cycas micronesica, Macaranga thompsonii* |
| Anao South | Substrate | 60% of ground cover is large rocks >20cm in diameter, some (~20% substrate) exposed red dirt | very rocky, loose rocks 10-50cm in diameter, small amounts (~10-15%) of exposed red dirt |
|  | Slope | flat | slight downward slope (<5 degrees) towards east |
|  | # adult trees | 7 | 11 |
|  | Species of adult trees | *Mammea odorata, Aglaia mariannensis, Meiogyne cylindrocarpa, Ochrosia oppositifolia* | *Mammea odorata, Ochrosia oppositifolia, Cynometra ramiflora, Meiogyne cylindrocarpa* |
| North Blas | Substrate | very rocky, no soil visible, rocks approx. 50cm in diameter | very rocky, no soil visible, rocks approx. 50cm in diameter |
|  | Slope | slight slope (<5 degs) downward towards NE, tower karst intermittent on all sides | in slight depression between towers of karst on north and south sides |
|  | Species of adult trees | *Aglaia mariannensis, Cynometra ramiflora, Morinda citrifolia, Macaranga thompsonii, Syzigium thompsonii* | *Aglaia mariannensis, Meiogyne cylindrocarpa, Mammea odorata* |
| South Blas | Substrate | very rugged; large, solid rocks on south side of plot, no soil showing | rugged, no soil showing |
|  | Slope | 0 | 0 |
|  | Species of adult trees | *Meiogyne cylindrocarpa, Ochrosia mariannensis* | *Meiogyne cylindrocarpa, Ochrosia mariannensis, Macaranga thompsonii* |
| Racetrack | Substrate | moderate karst, scattered boulders 0.5-m in diameter | moderate karst, scattered boulders and rocks 0.2 to 0.5-m in diameter |
|  | Slope | 0 | 0 |
|  | Species of adult trees | *Eugenia reinwardtiana* | *Eugenia reinwardtiana, Meiogyne cylindrocarpa* |
| Racetrack Fragment | Substrate | very rocky, high amount of *Eugenia* leaf litter | very rocky, high amount of *Eugenia* leaf litter |
|  | Slope | 0 | 0 |
|  | Species of adult trees | *Eugenia reinwardtiana, Aglaia mariannensis* | *Eugenia reinwardtiana* |