

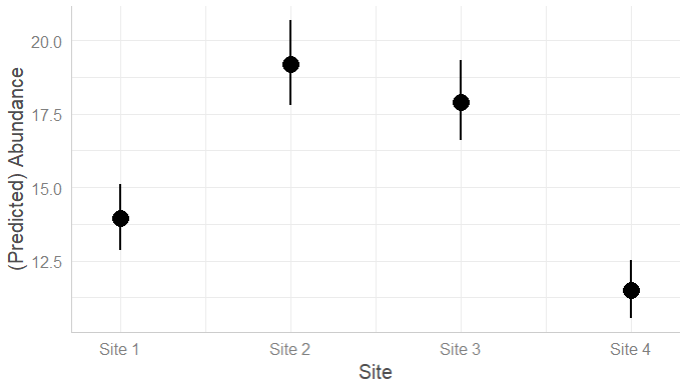
**Arthropod abundance**

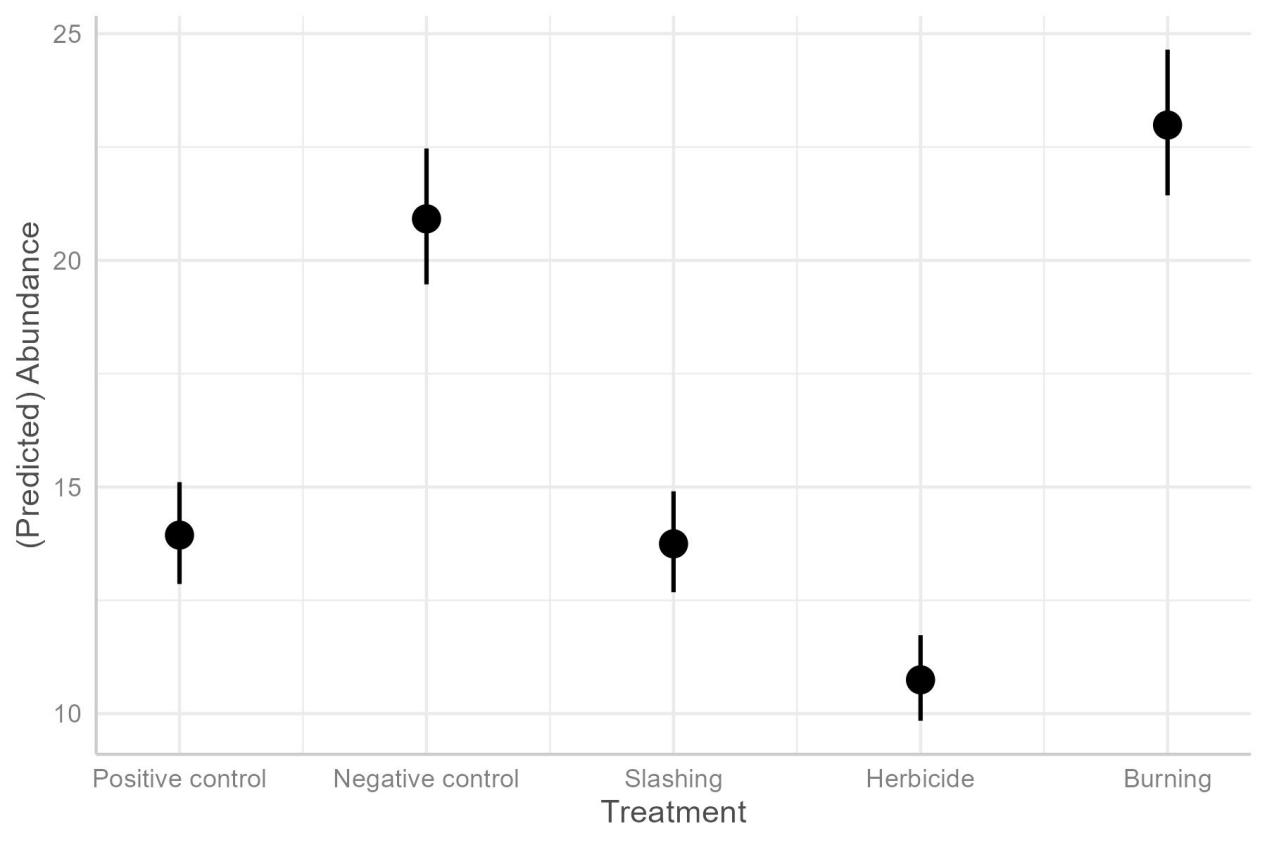
Arthropod abundance varied significantly across treatments and over time (Table X). Compared with the positive control (invaded and untreated), the negative control (uninvaded site) supported higher arthropod abundance (estimate = 0.41, z = 9.65, p < 0.001). Burning also led to significantly higher abundance relative to the positive control (estimate = 0.50, z = 12.12, p < 0.001). In contrast, herbicide application reduced arthropod abundance (estimate = –0.26, z = –5.27, p < 0.001), while slashing did not differ significantly from the positive control (estimate = –0.01, z = –0.30, p = 0.76).

Post-hoc comparisons confirmed these patterns. Abundance in burned plots and the negative control was significantly higher than in the positive control and slashed plots, but there was no significant difference between burned plots and the negative control. Similarly, the positive control did not differ significantly from slashed plots. By contrast, herbicide-treated plots supported significantly lower abundance than all other treatments.

Estimated marginal means showed that abundance was lowest in herbicide plots (emmean = 2.47, 95% CI: 2.37–2.56), intermediate in slashed (2.71, 95% CI: 2.63–2.80) and positive control sites (2.73, 95% CI: 2.64–2.81), and highest in the negative control (3.13, 95% CI: 3.07–3.20) and burned plots (3.23, 95% CI: 3.16–3.29).

Across all treatments, arthropod abundance declined slightly but significantly with increasing time after treatment (estimate = –0.013 per sampling period, z = –7.81, p < 0.001). Site-level variation was also evident, with higher abundance in Sites 2 and 3 compared with Site 1, and reduced abundance in Site 4.



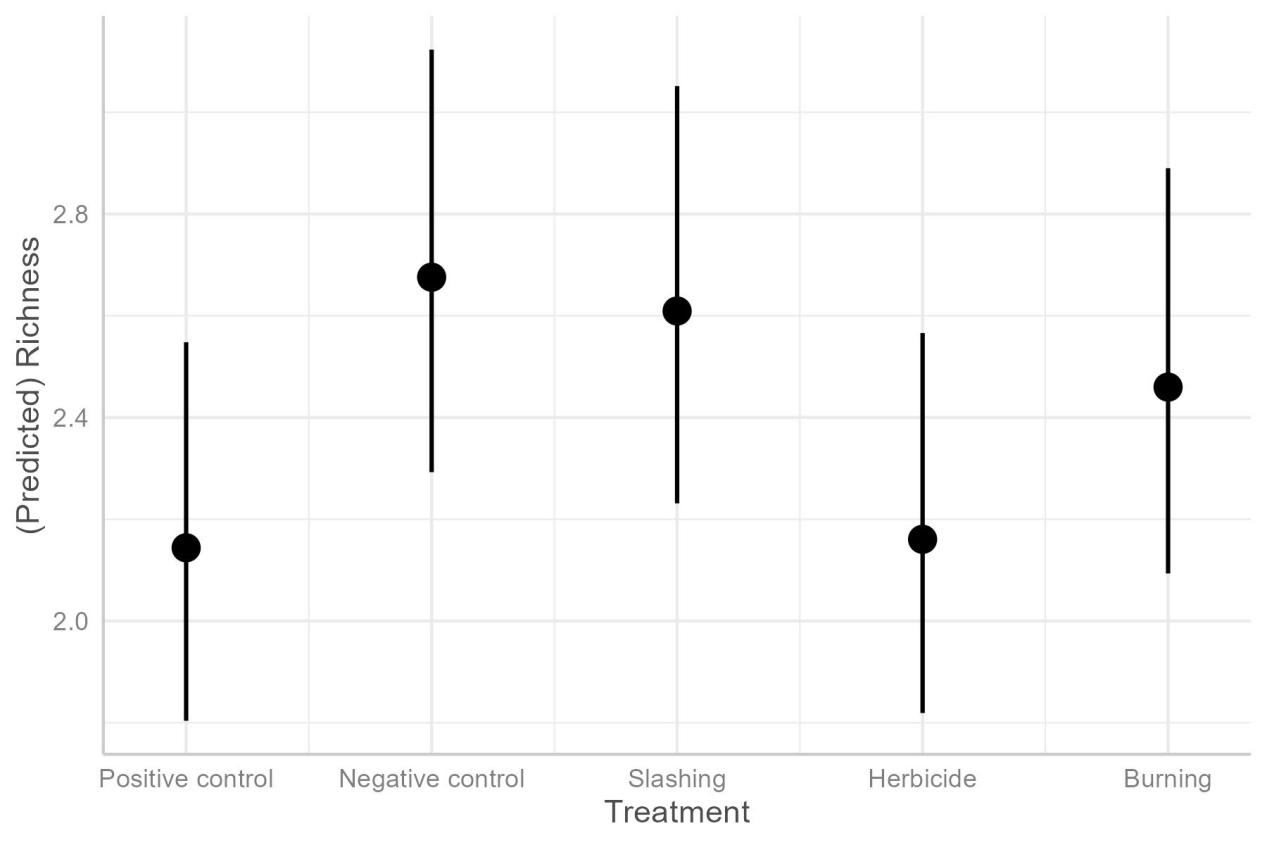


**Arthropod richness**

Species richness did not differ significantly among treatments (Table X). Compared with the positive control, the negative control (estimate = 0.22, z = 1.88, p = 0.06) and slashing (estimate = 0.20, z = 1.65, p = 0.10) showed a tendency toward higher richness, but these effects were not statistically significant. Herbicide (estimate = 0.01, z = 0.06, p = 0.95) and burning (estimate = 0.14, z = 1.14, p = 0.25) did not differ from the positive control.

Post-hoc Sidak comparisons likewise did not detect any significant differences among treatments, with all treatments grouped together. However, the estimated marginal means suggested slightly higher richness in the negative control (emmean = 0.98, 95% CI: 0.78–1.19) and slashing plots (0.96, 95% CI: 0.75–1.16) compared with the positive control (0.76, 95% CI: 0.54–0.99) and herbicide (0.77, 95% CI: 0.54–1.00).

Across treatments, species richness declined slightly but significantly with increasing time after treatment (estimate = –0.0095 per sampling period, p = 0.045). Also, unlike for abundance, site level variation was not significant (P<.05)

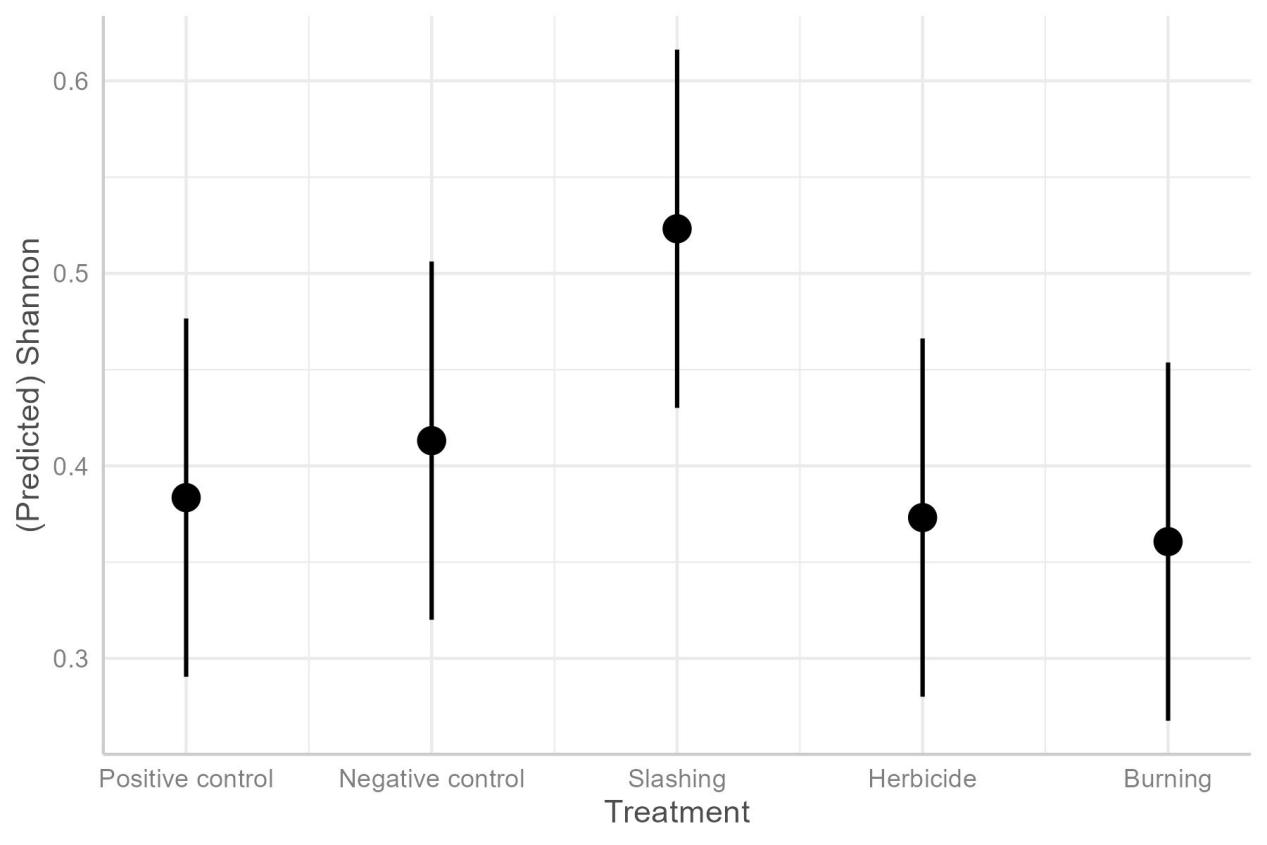


**Shannon diversity**

Shannon diversity differed only weakly among treatments (Table X). Compared with the positive control, neither the negative control (estimate = 0.03, t = 0.44, p = 0.66), herbicide (estimate = –0.01, t = –0.16, p = 0.88), nor burning (estimate = –0.02, t = –0.34, p = 0.73) showed significant differences in diversity. However, slashing supported significantly higher Shannon diversity than the positive control (estimate = 0.14, t = 2.09, p = 0.038).

Post-hoc Sidak comparisons did not detect significant pairwise differences among treatments, with all treatments grouped together. Nevertheless, the estimated marginal means revealed consistent trends in diversity values. Shannon diversity was lowest in burned plots (emmean = 0.36, 95% CI: 0.24–0.48) and herbicide-treated plots (0.37, 95% CI: 0.25–0.50), intermediate in the positive control (0.38, 95% CI: 0.26–0.51) and negative control (0.41, 95% CI: 0.29–0.54), and highest in slashed plots (0.52, 95% CI: 0.40–0.65). Thus, although conservative post-hoc testing did not detect significant differences, slashed plots consistently supported the greatest Shannon diversity, while burned and herbicide-treated plots tended to support the lowest.

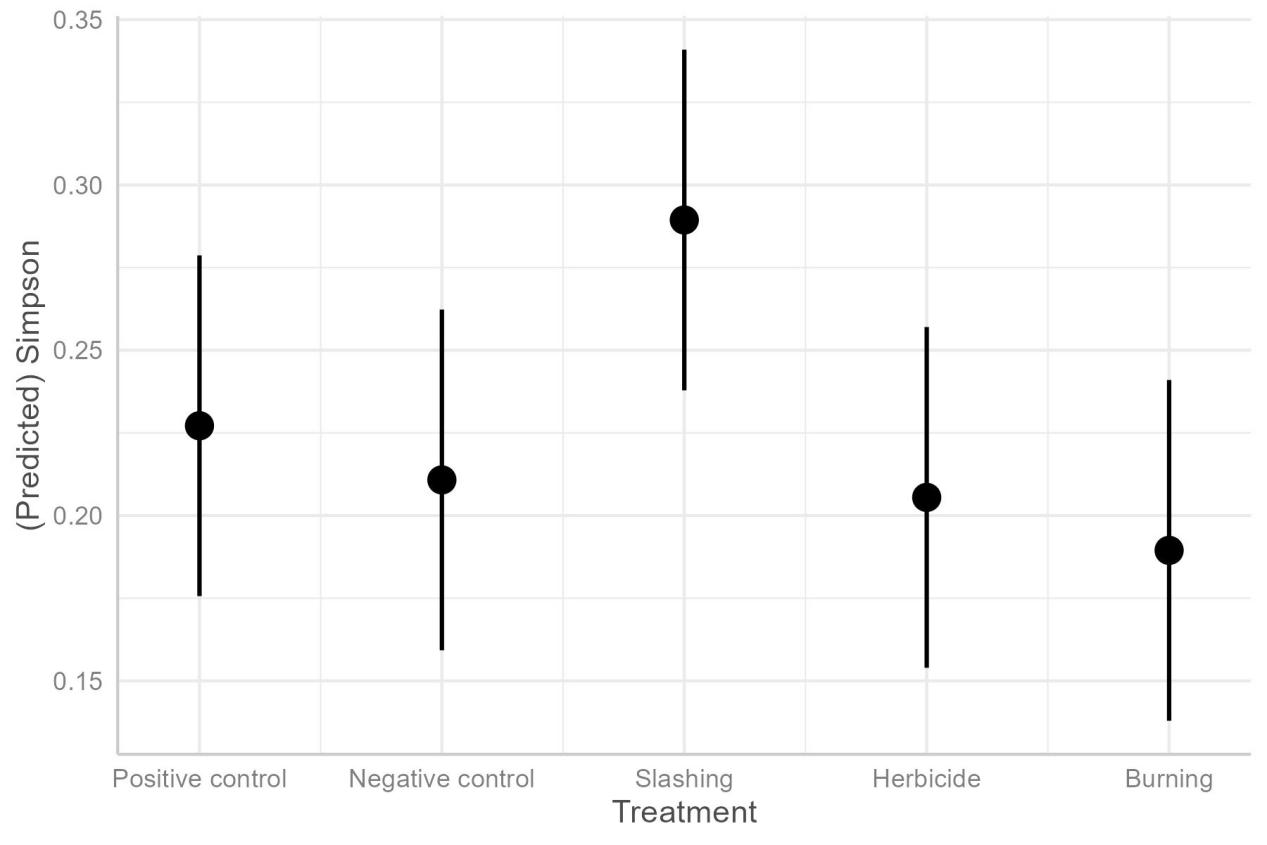
Across all treatments, Shannon diversity declined slightly but significantly with increasing time after treatment (estimate = –0.0065 per sampling period, t = –2.46, p = 0.014). This suggests that temporal dynamics following treatment exerted a subtle but detectable influence on arthropod diversity.



**Simpson’s diversity index**

Mean Simpson’s index values ranged from 0.189 (burning) to 0.289 (slashing), with overlapping confidence intervals indicating homogeneity among treatments.

A linear model was fitted to test the effects of treatment and time (period) on Simpson’s diversity index. Among the predictors, period had a significant negative effect on diversity (estimate = –0.0038 ± 0.0015, t = –2.58, p = 0.011), indicating a slight decline in Simpson’s index over time. In contrast, treatment effects were generally weak and non-significant. Compared to the reference treatment (control), neither burning, herbicide, nor negative control plots differed significantly in Simpson’s index (all p > 0.30). Slashing treatment showed a marginally higher Simpson’s index (estimate = 0.062 ± 0.037, t = 1.68, p = 0.094), but this effect did not reach conventional significance.



**Margalef index**

The linear model assessing the effects of treatment and time on Margalef’s richness index explained a small proportion of the variance (F(5, 292) = 1.93, p = 0.090, adjusted R² = 0.015). Overall, the model was not statistically significant at the 0.05 level. Among predictors, period showed a significant negative effect (estimate = –0.0083 ± 0.0036, t = –2.29, p = 0.023), suggesting that species richness decreased slightly over time. Treatment effects were generally weak and not statistically significant. Compared to the reference group, slashing treatment tended to increase Margalef’s index (estimate = 0.151 ± 0.091, t = 1.66, p = 0.099), but this effect was only marginal. Negative control, herbicide, and burning treatments showed no meaningful differences in Margalef’s index (all p > 0.40).

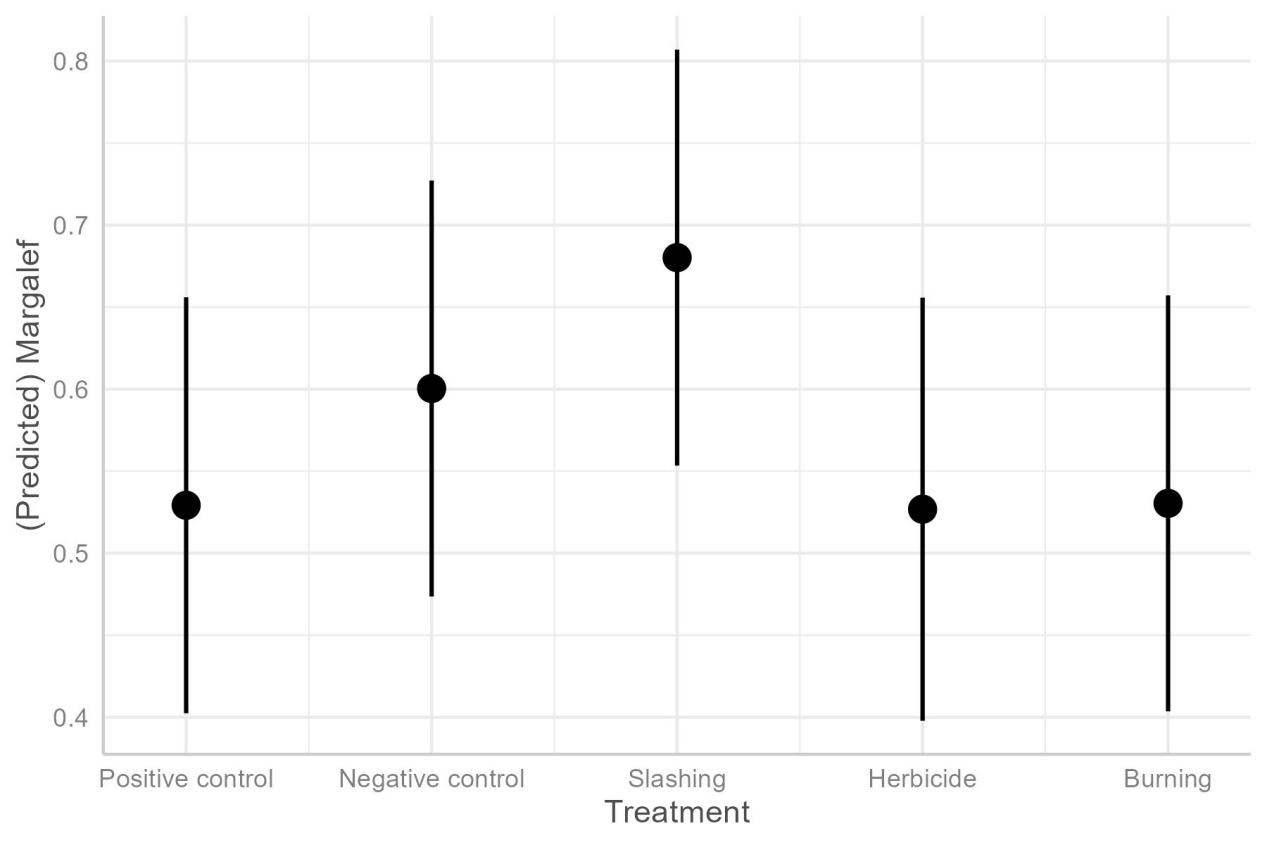


Table: Compaision of treatmet methods and abundance and biodiversity metrices.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Indices | Treatment | Mean | SE | asymp.LCL | asymp.UCL | Sidak group |
| Abundance | Positive control | 2.73 | 0.03 | 2.64 | 2.81 | b |
|  | Negative control | 3.13 | 0.03 | 3.07 | 3.20 | c |
|  | Slashing | 2.71 | 0.03 | 2.63 | 2.80 | b |
|  | Herbicide | 2.47 | 0.04 | 2.37 | 2.56 | a |
|  | Burning | 3.23 | 0.03 | 3.16 | 3.29 | c |
| Richness | Positive control | 0.76 | 0.09 | 0.54 | 0.99 | a |
|  | Negative control | 0.98 | 0.08 | 0.78 | 1.19 | a |
|  | Slashing | 0.96 | 0.08 | 0.75 | 1.16 | a |
|  | Herbicide | 0.77 | 0.09 | 0.54 | 1.00 | a |
|  | Burning | 0.90 | 0.08 | 0.69 | 1.11 | a |
| Shannon | Burning | 0.36 | 0.05 | 0.24 | 0.48 | a |
|  | Herbicide | 0.37 | 0.05 | 0.25 | 0.50 | a |
|  | Positive control | 0.38 | 0.05 | 0.26 | 0.51 | a |
|  | Negative control | 0.41 | 0.05 | 0.29 | 0.54 | a |
|  | Slashing | 0.52 | 0.05 | 0.40 | 0.65 | a |
| Simpson | Burning | 0.19 | 0.03 | 0.12 | 0.26 | a |
|  | Herbicide | 0.21 | 0.03 | 0.14 | 0.27 | a |
|  | Negative control | 0.21 | 0.03 | 0.14 | 0.28 | a |
|  | Positive control | 0.23 | 0.03 | 0.16 | 0.29 | a |
|  | Slashing | 0.29 | 0.03 | 0.22 | 0.36 | a |
| Margalef | Positive control | 0.53 | 0.06 | 0.36 | 0.70 | a |
|  | Negative control | 0.60 | 0.06 | 0.43 | 0.77 | a |
|  | Slashing | 0.68 | 0.06 | 0.51 | 0.85 | a |
|  | Herbicide | 0.53 | 0.07 | 0.36 | 0.70 | a |
|  | Burning | 0.53 | 0.06 | 0.36 | 0.70 | a |

**Species accumulation curves**

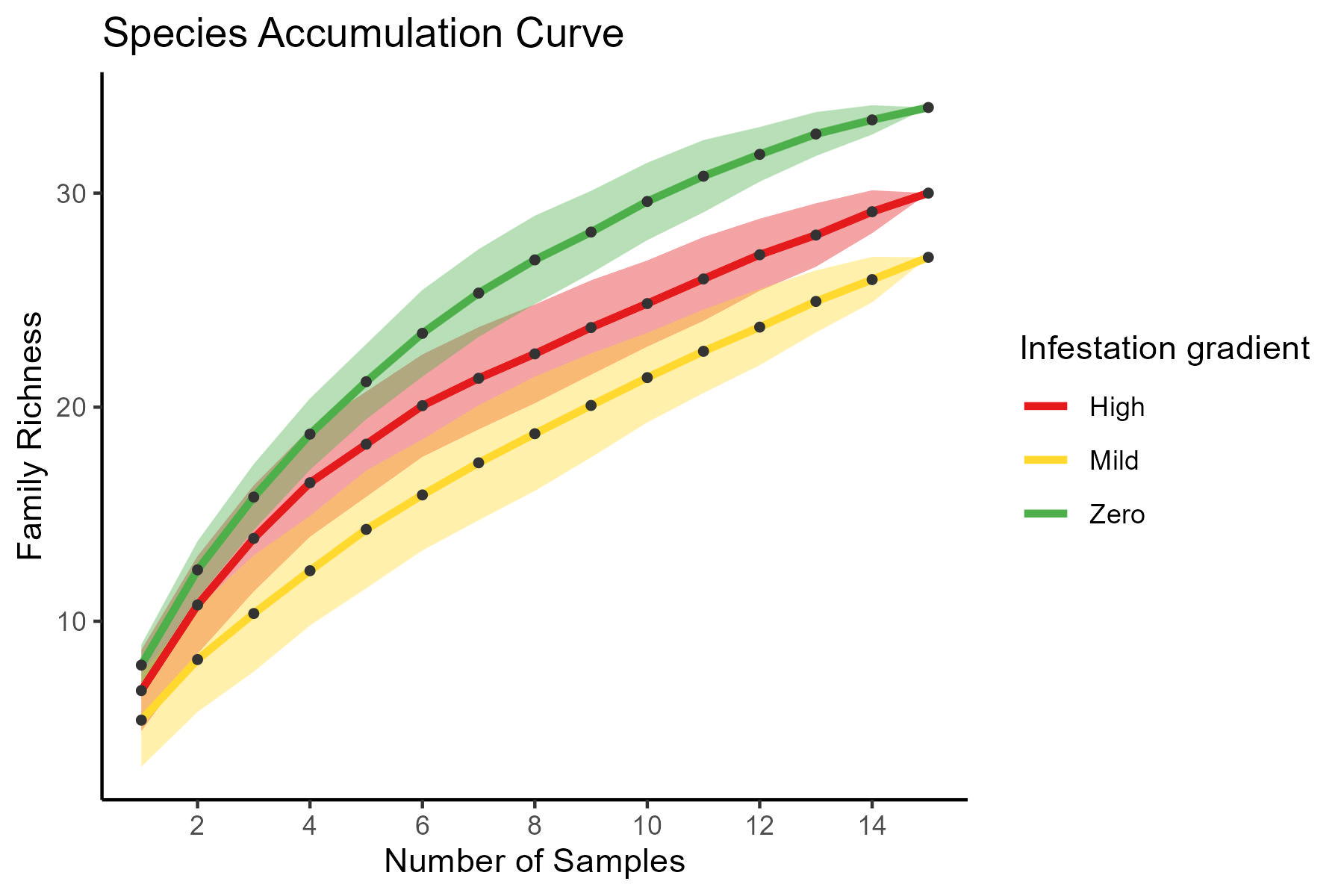


Figure \_: Igueosagie Pitfall wet season

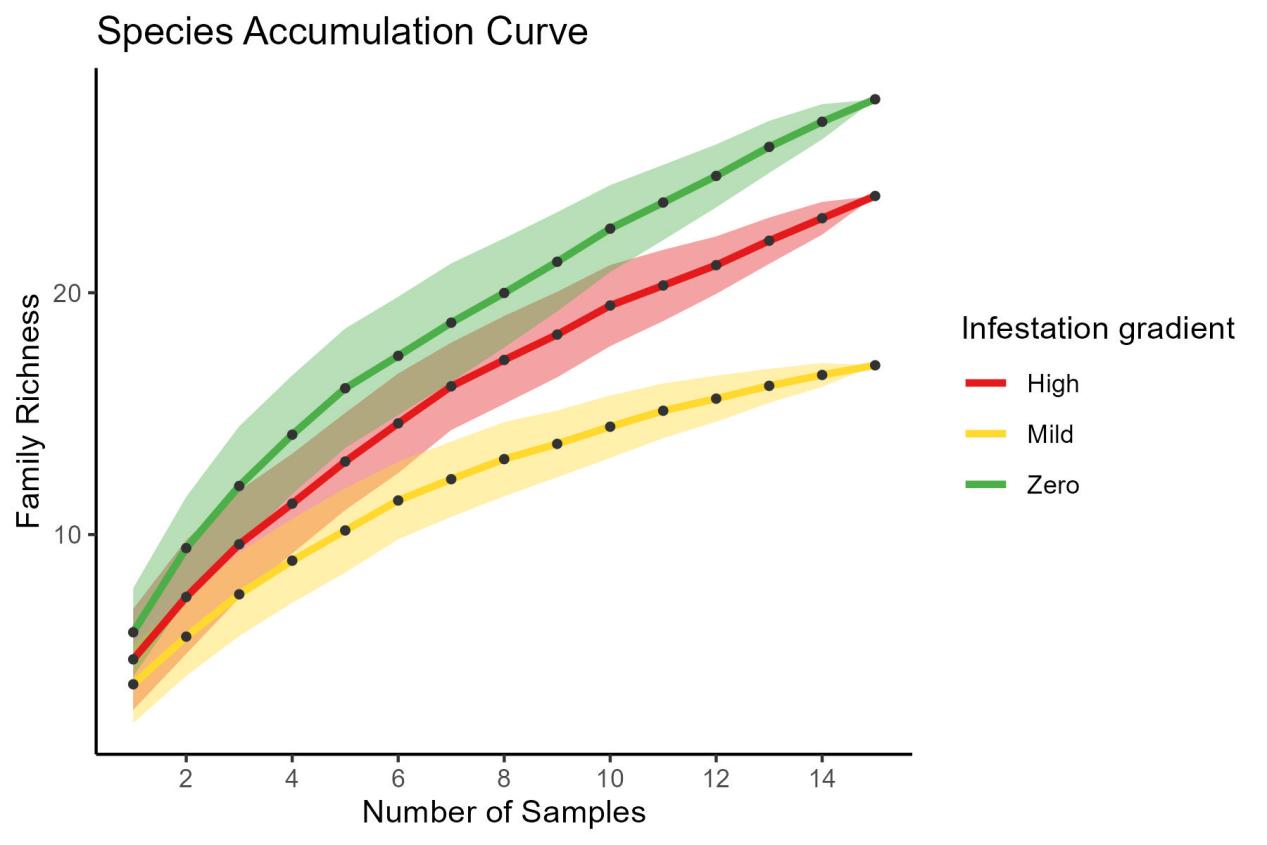
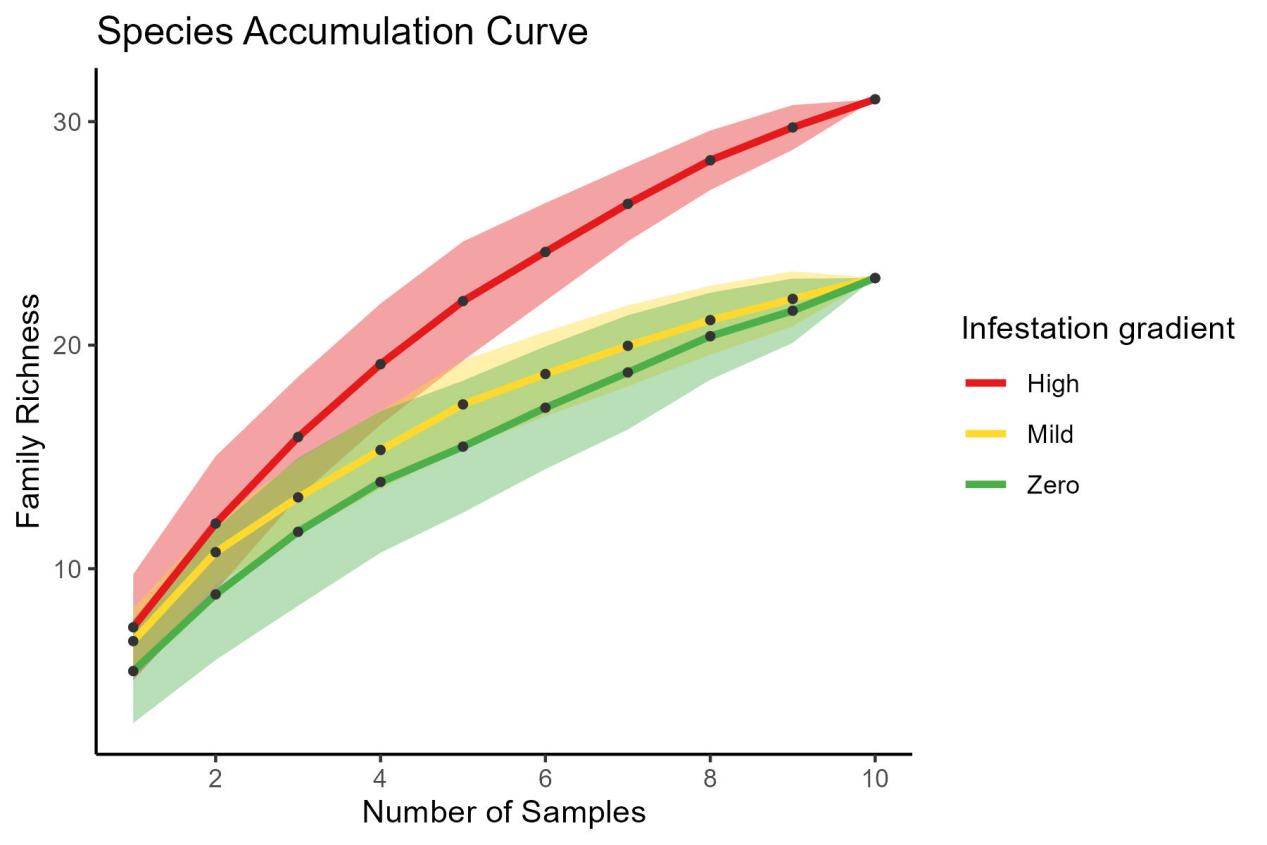
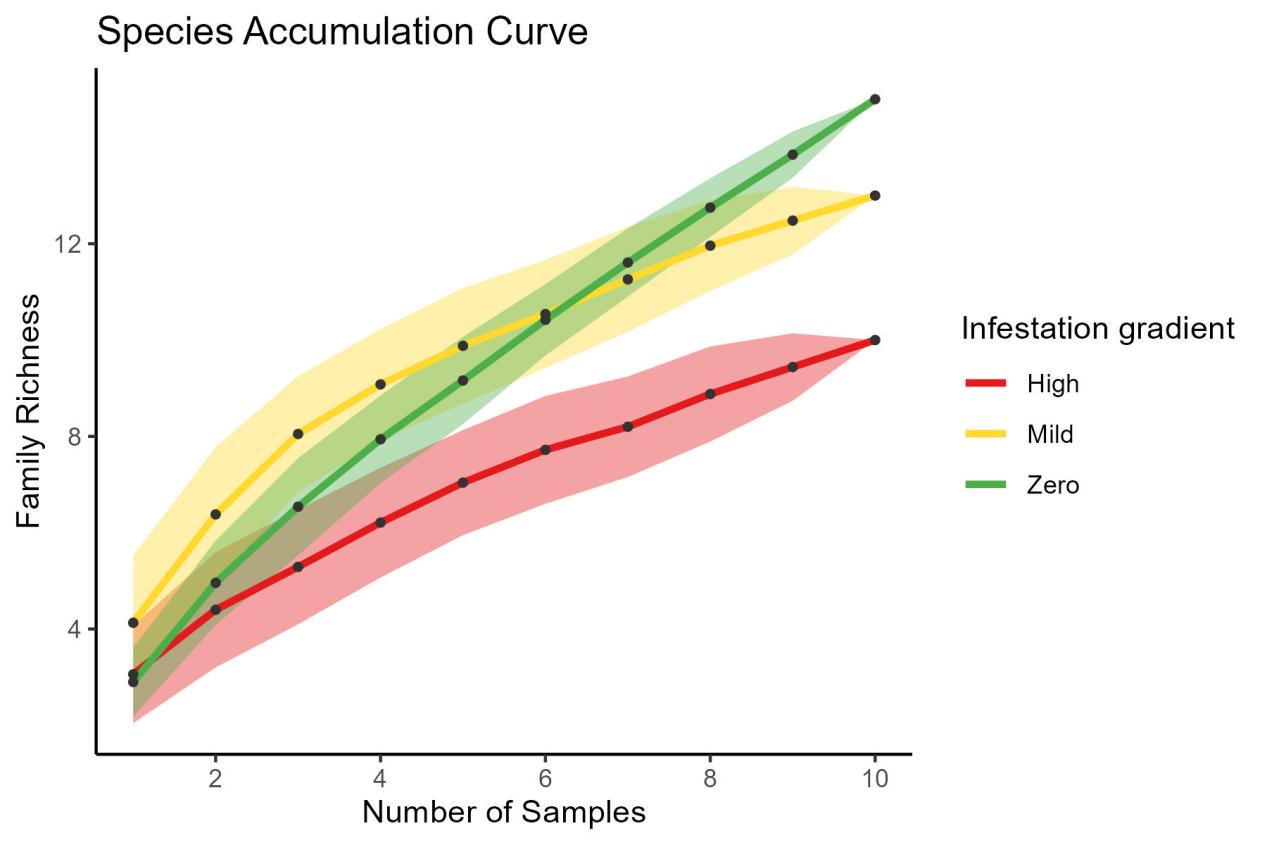


Figure \_: Igueosagie Pitfall wet season



Figure\_: Igueosagie beating tray Wet season



Figure\_: Igueosagie beating tray dry season

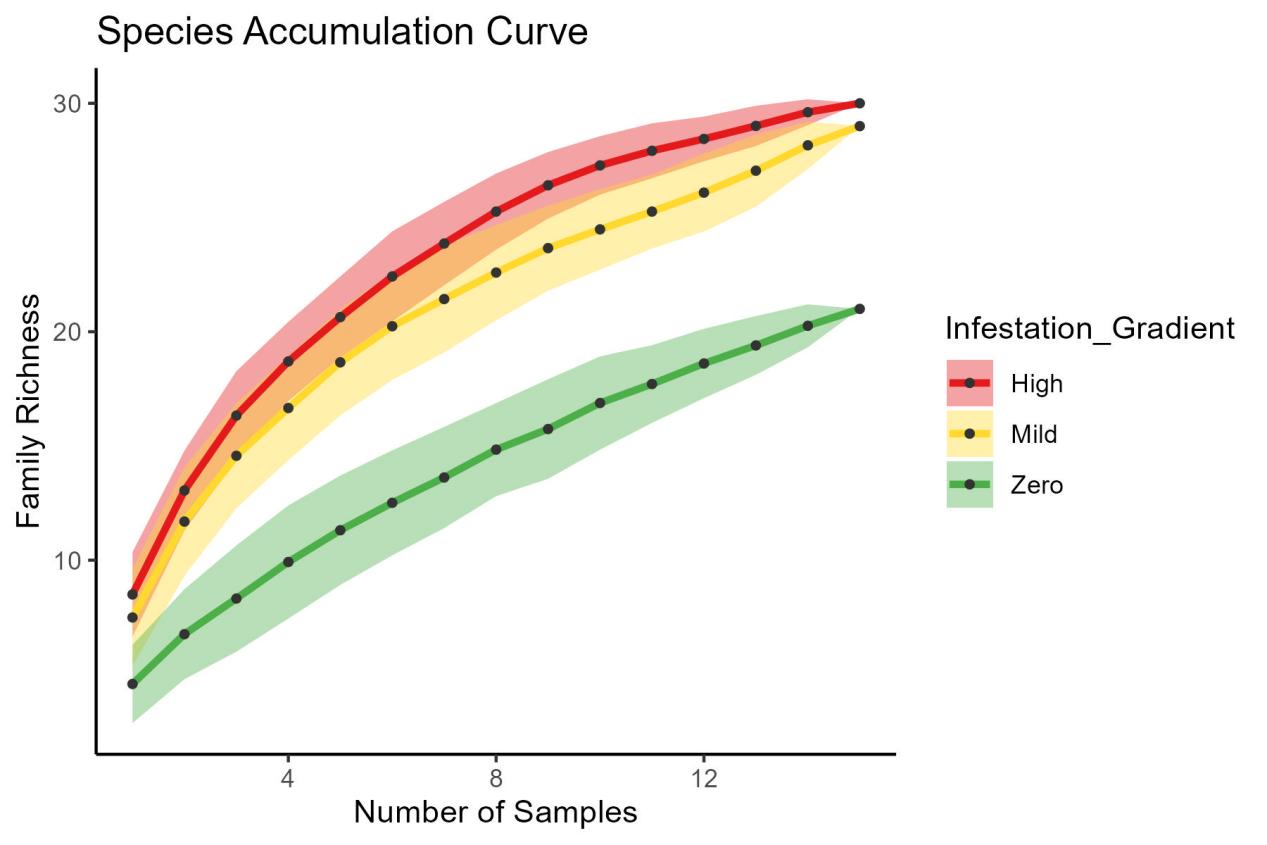


Figure: Ogua pitfall wet season

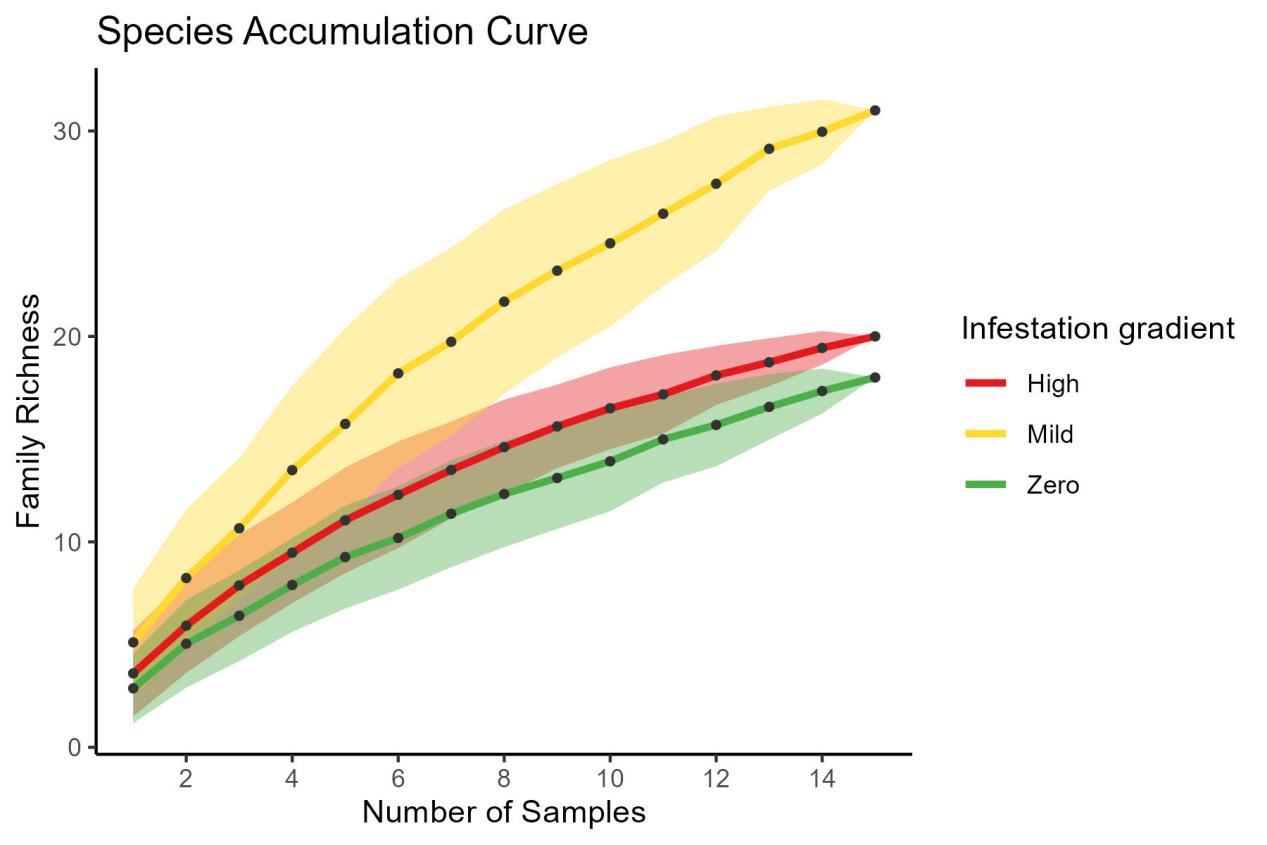
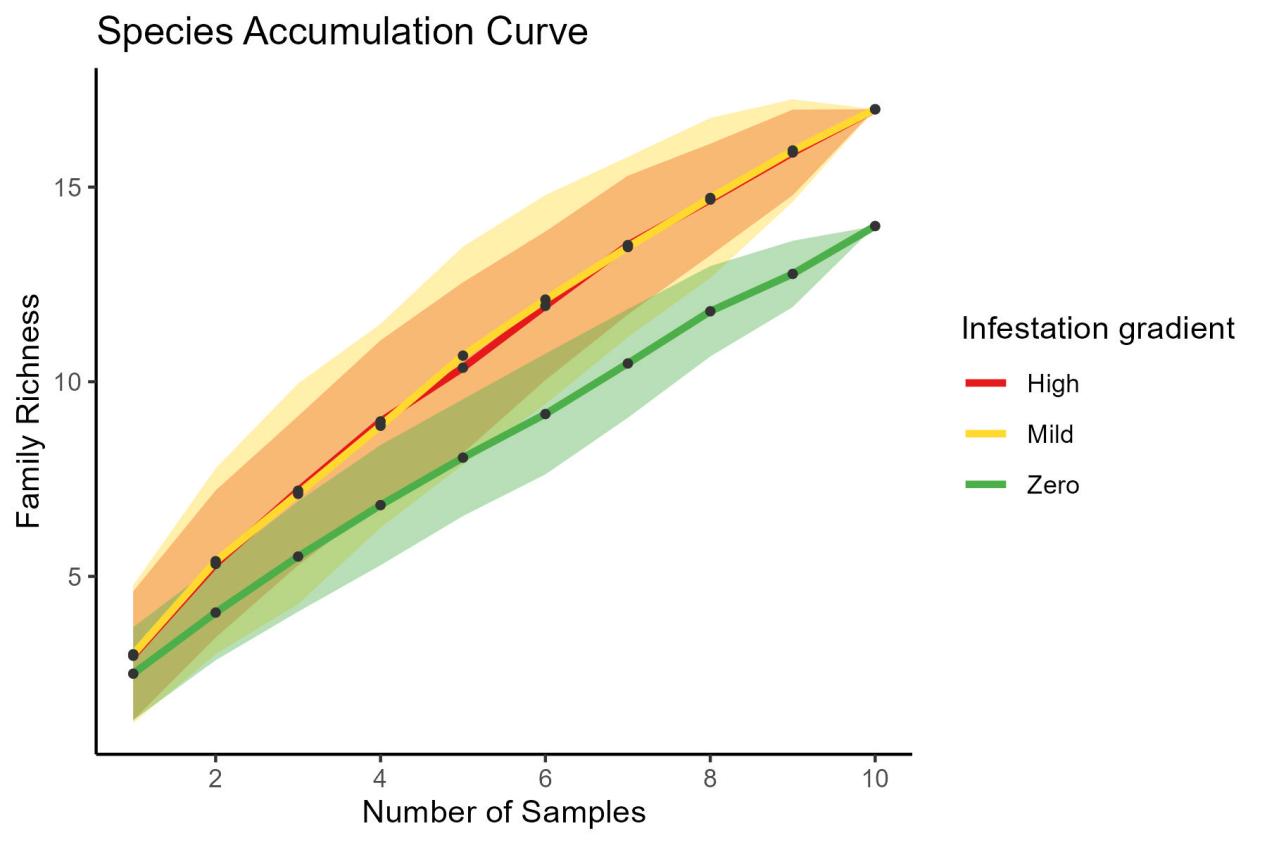
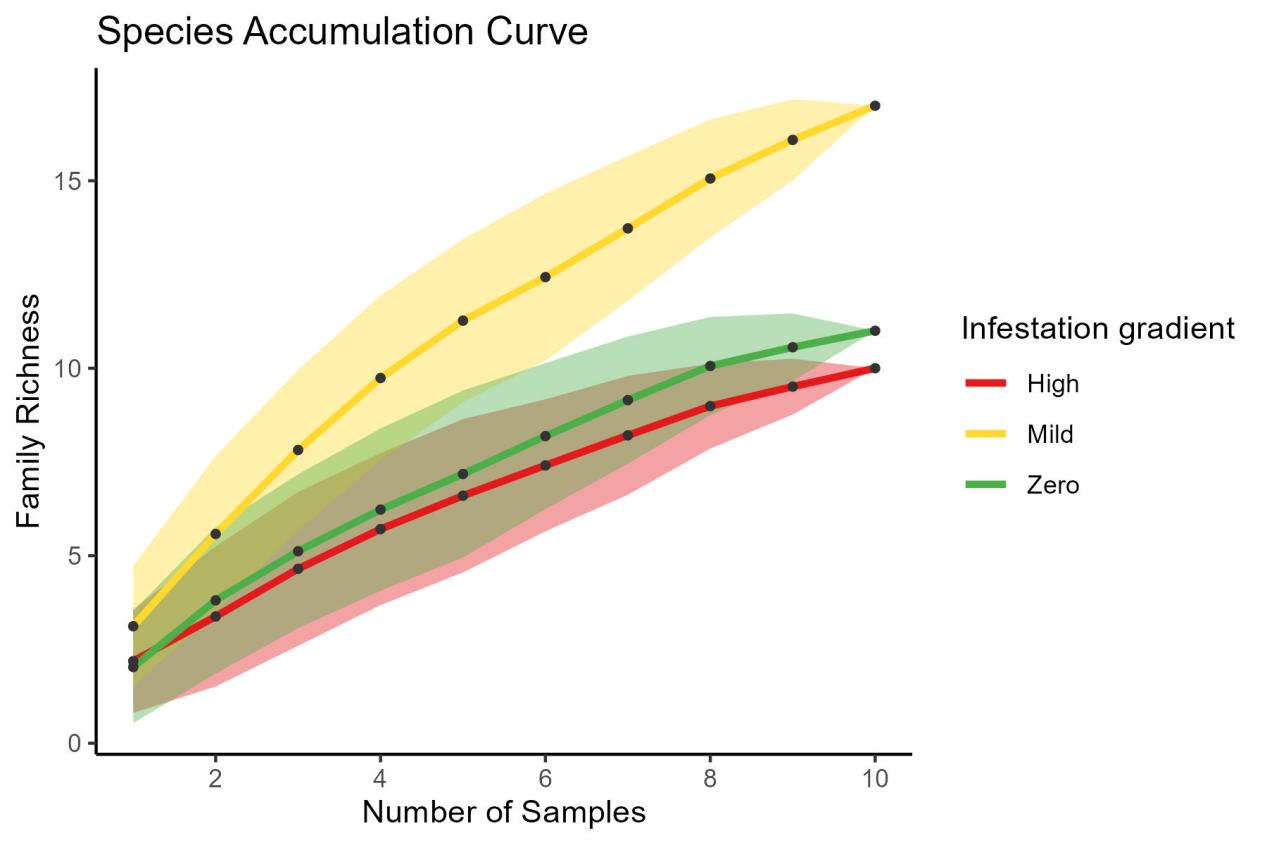


Figure: Ogua pitfall dry season



Figure\_: Ogua beating tray wet season



Figure\_: Ogua beating tray dry season

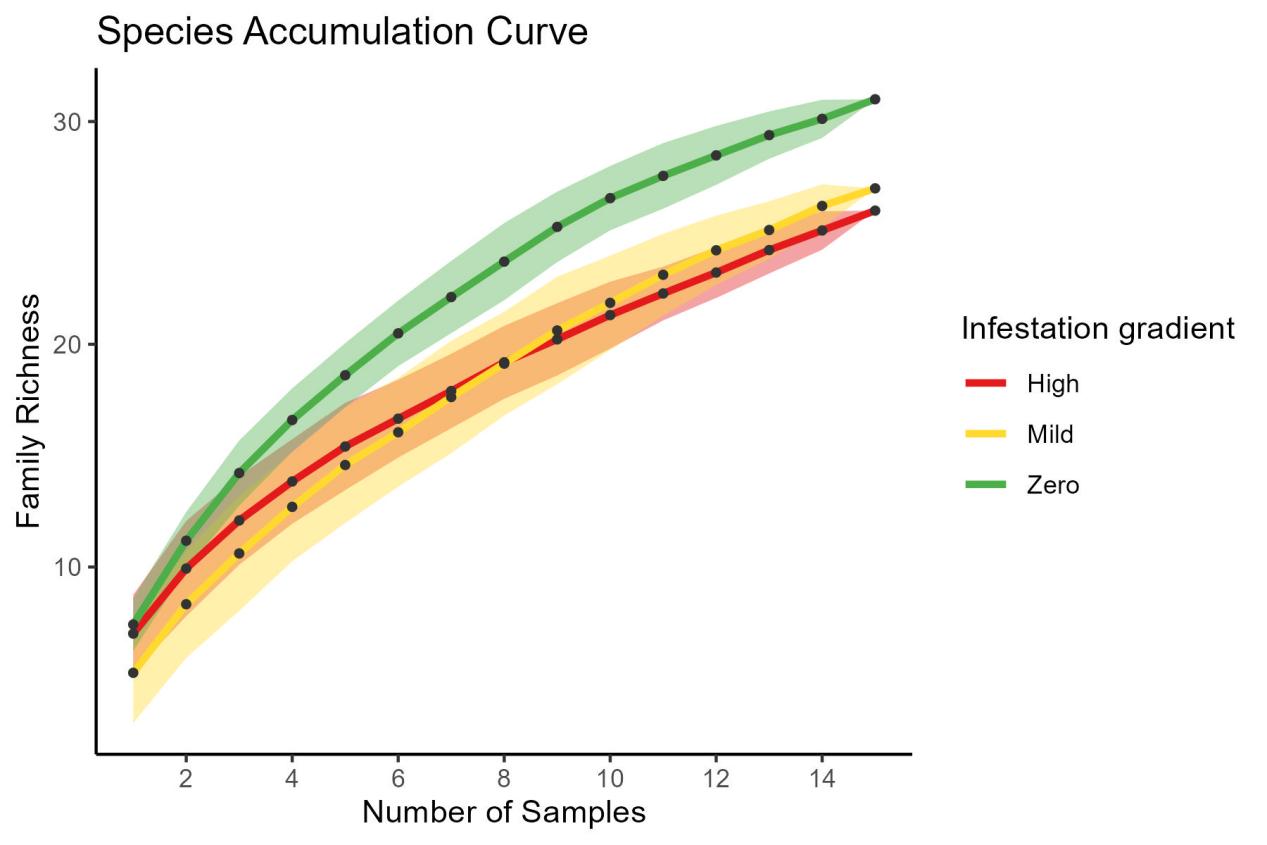


Figure \_ : Iguovbiobo pitfall trap wet season

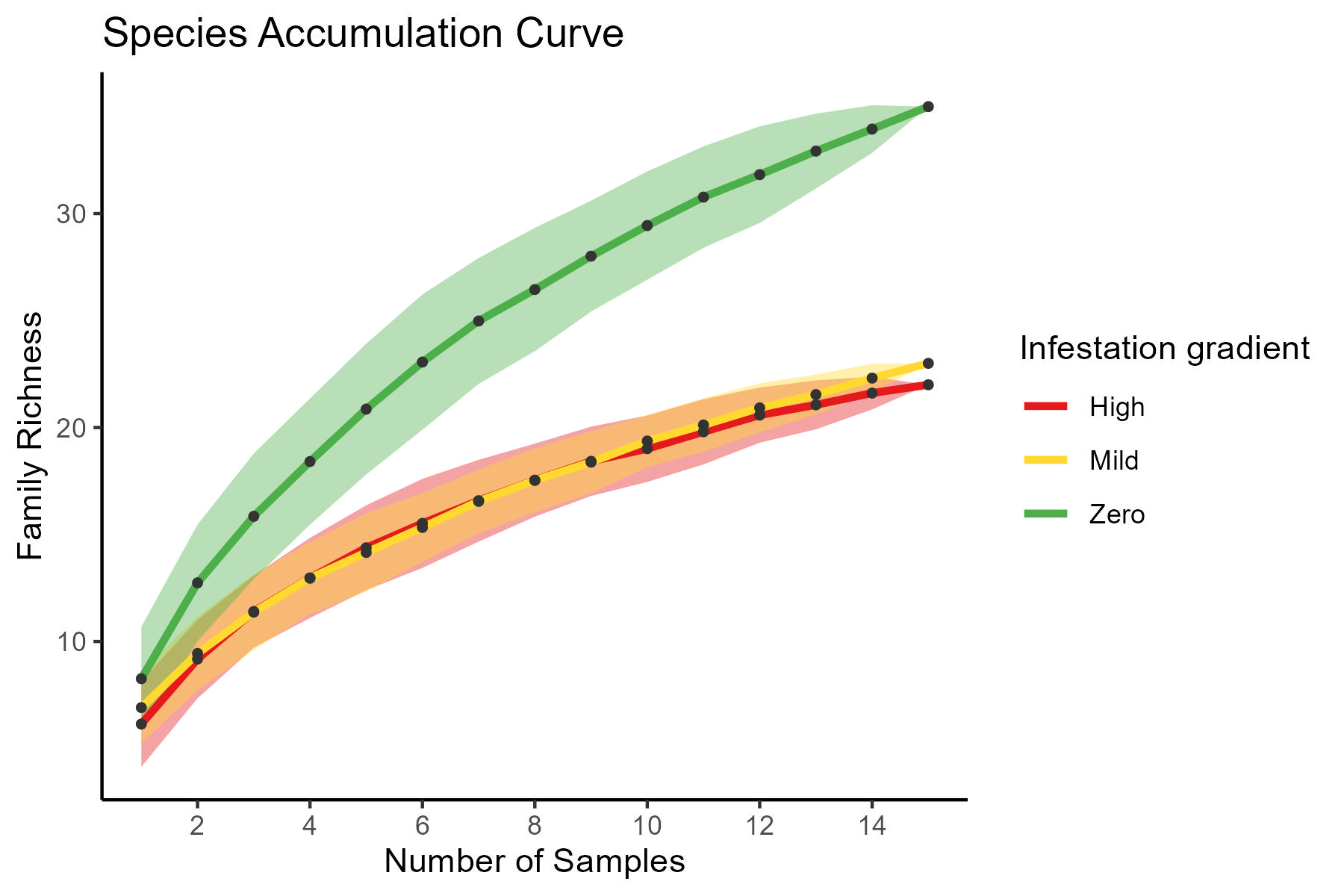


Figure: Iguovbiovo pitfall trap dry season.

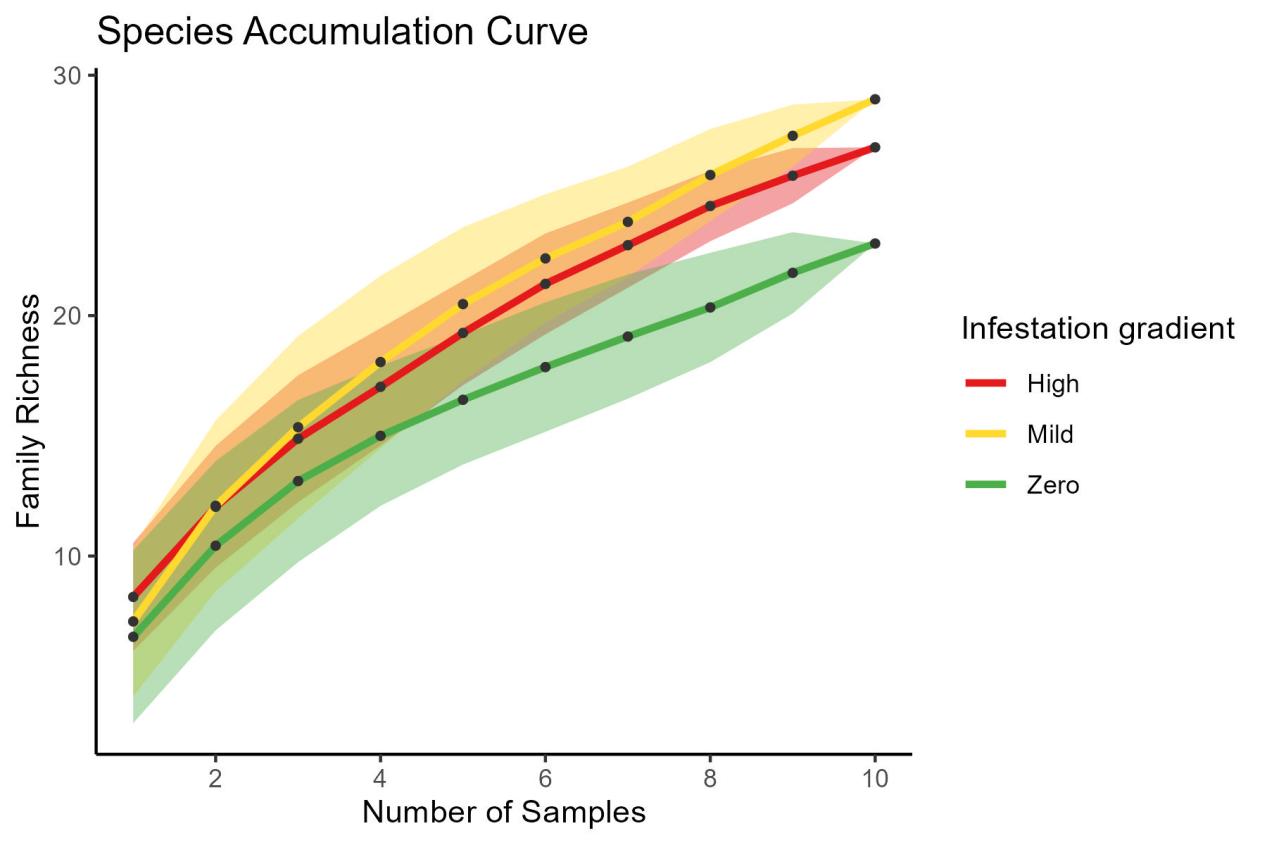


Figure \_: Iguovbiovo beating tray wet season

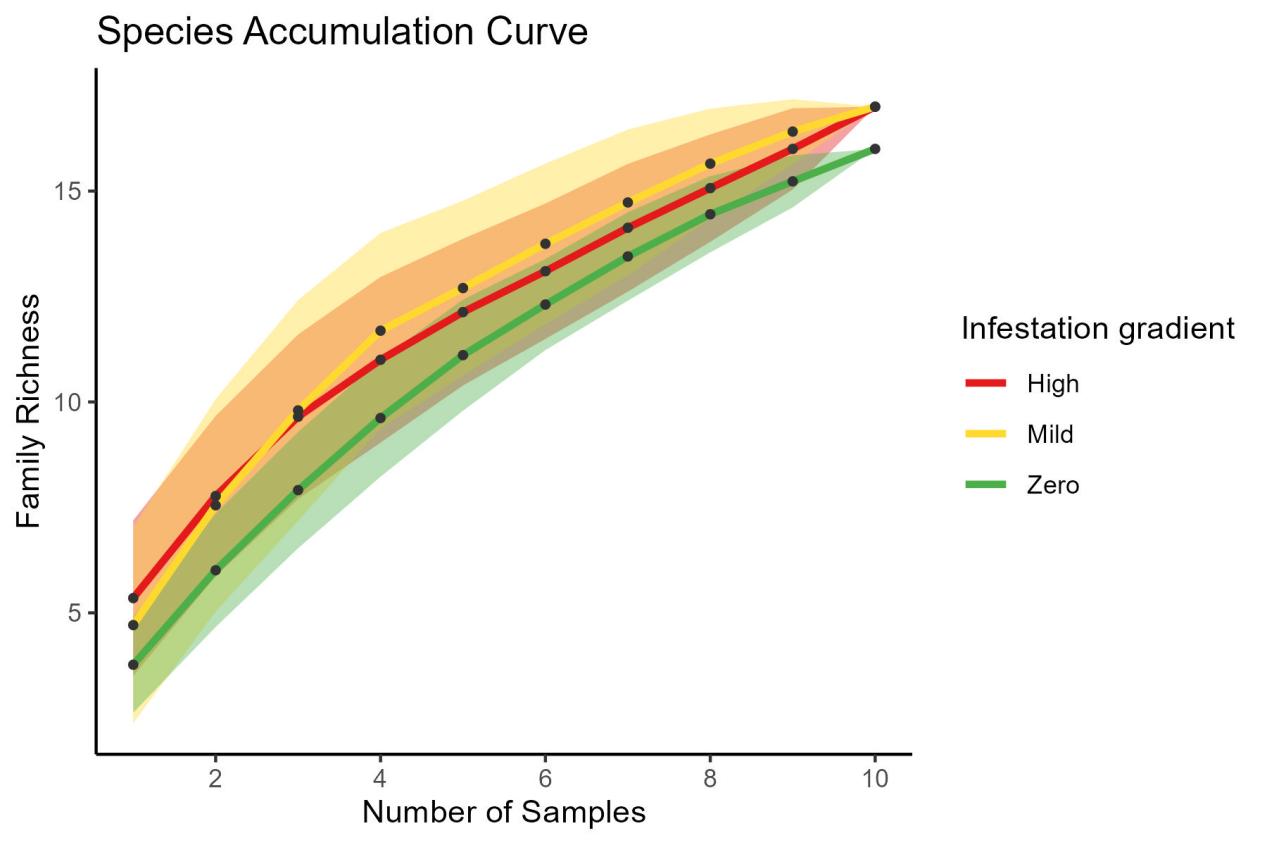
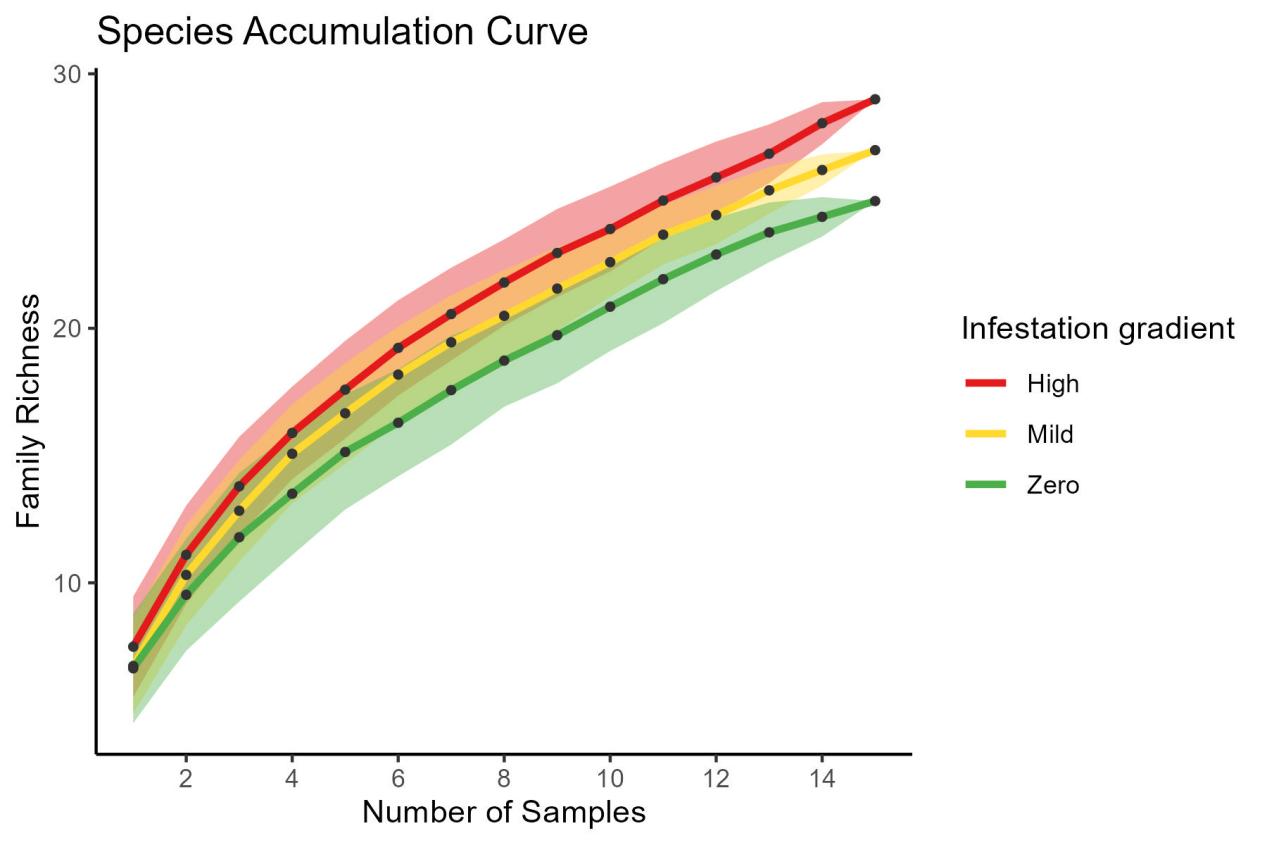
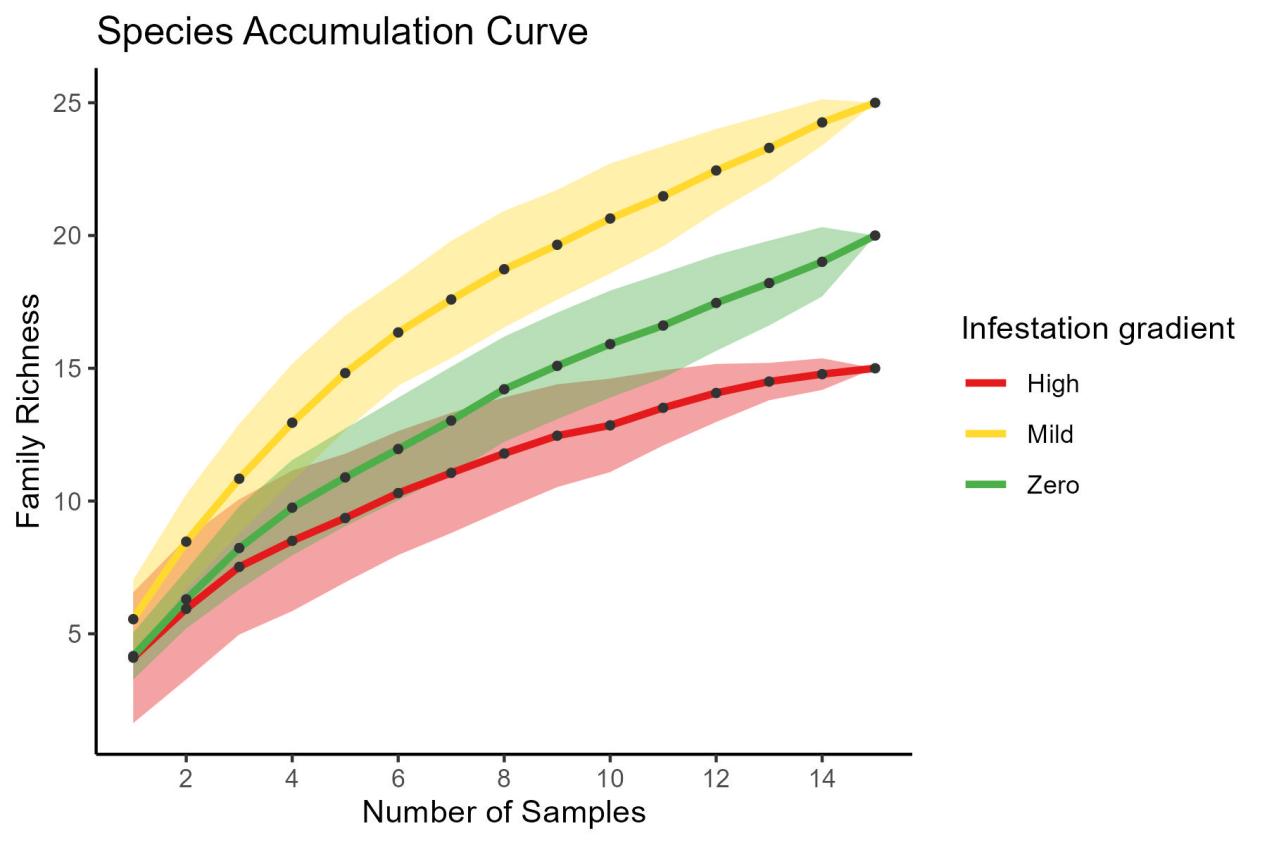


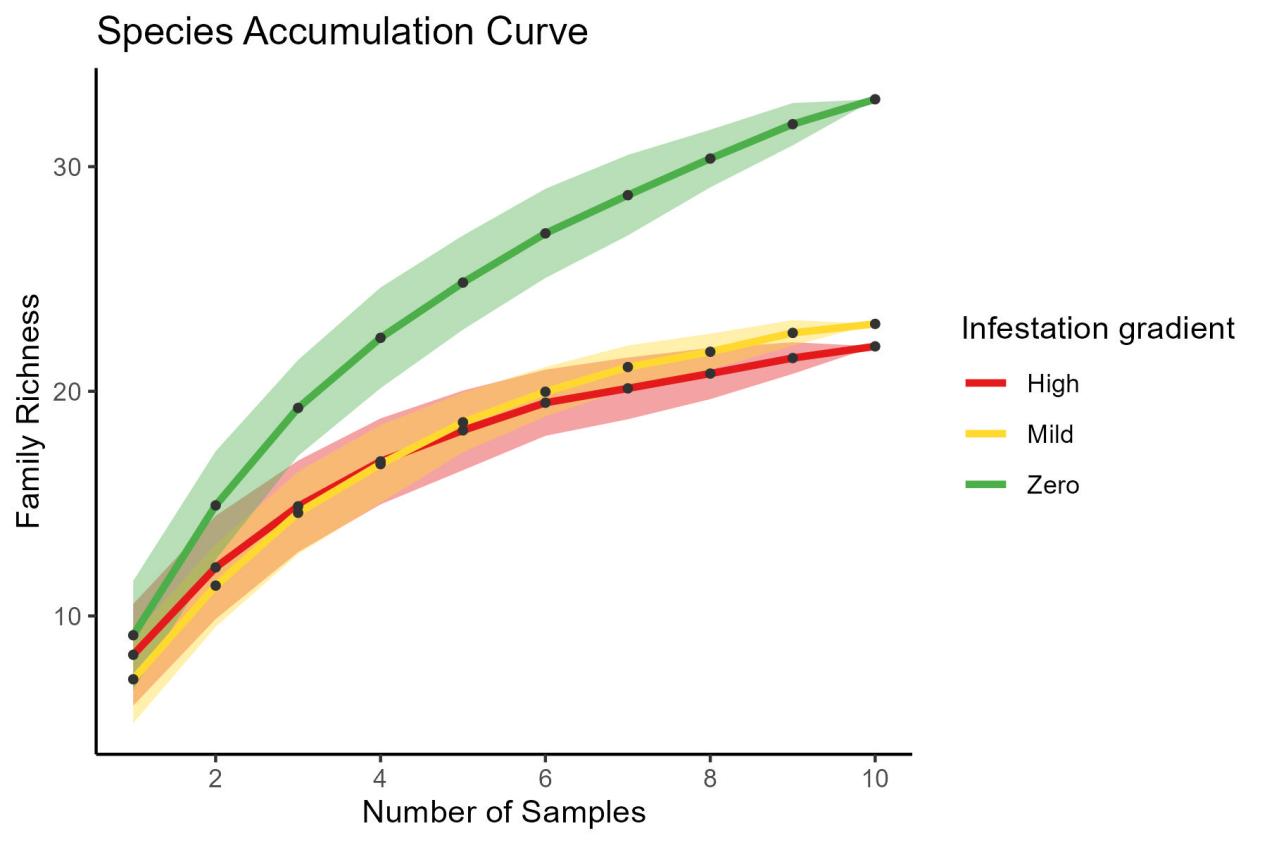
Figure: Iguovbiovo beating tray dry season



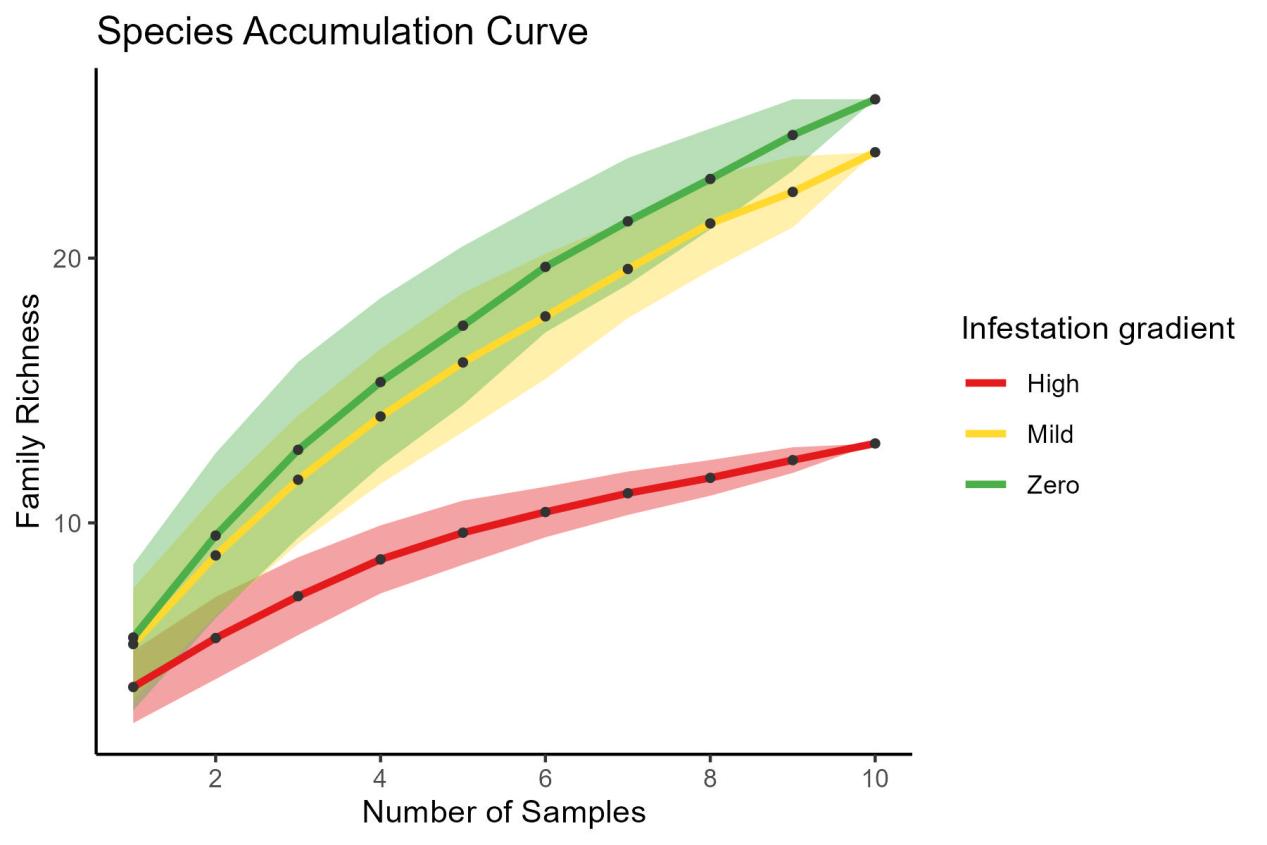
Figure\_: Ahor urokosa Pitfall wet season



Figure\_: Ahor urokosa Pitfall dry season



Figure\_: Ahor urokosa beating tray wet season



Diversity indices varied across villages, seasons, and levels of Chromolaena invasion (Table X). In general, species diversity (Shannon and Simpson indices) was lowest under high invasion pressure during the dry season, while sites with little or no invasion consistently supported higher diversity. For example, in Ahor-Urokosa and Iguegosagie, Shannon values increased steadily from high invasion to zero invasion during the dry season, with Simpson’s index showing a similar trend.

Across all villages, wet-season communities exhibited higher diversity than their dry-season counterparts. In Iguegosagie, for instance, Shannon values during the wet season reached 2.95 under zero invasion compared with only 0.79 under high invasion in the dry season. Similarly, in Ogua, wet-season sites under high invasion recorded Shannon values above 2.8 compared with less than 1.0 during the dry season.

Species richness and Margalef’s index also followed these patterns, with higher richness recorded in the wet season across most sites. Notably, Iguovbiobo and Iguegosagie recorded the highest richness values (47–50 species) in the wet season under low or no invasion. Conversely, abundance tended to peak under high invasion during the dry season—for example, Iguovbiobo recorded over 1400 individuals under zero invasion, and Ogua recorded more than 1200 under high invasion, despite lower diversity.

The effects of season and infestation gradient on arthropod abundance was evaluated using a generalized linear mixed model with a Poisson error distribution and log link, including Village as a random effect. The model provided a good fit to the data (AIC = 1894.5, BIC = 1902.7, logLik = –940.2).

Random-effect variance components indicated modest variation among villages (intercept variance = 0.0135, SD = 0.116) and a negative correlation (–0.50) between the random intercepts and slopes for season.

Fixed effects revealed strong and significant influences of both season and infestation gradient on abundance (Table X). Relative to the dry season, arthropod abundance was significantly reduced during the wet season (estimate = –0.662, SE = 0.147, z = –4.52, p < 0.001). Infestation gradient also had significant effects: mild infestation was associated with a decrease in abundance (estimate = –0.149, SE = 0.022, z = –6.66, p < 0.001), whereas high infestation was associated with an increase in abundance (estimate = 0.191, SE = 0.021, z = 9.31, p < 0.001), relative to the baseline category.

Table\_: Biodiversity levels of the sites for each village at dry and wet seasons

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Village | Season | Infestation gradient | Shannon | Simpson | Margalef | Richness | Abundance |
| Ahor-Urokosa | Dry | High | 0.6514332 | 0.2131191 | 3.221691 | 23 | 924 |
| Ahor-Urokosa | Dry | Mild | 1.4892204 | 0.4950301 | 5.563455 | 37 | 646 |
| Ahor-Urokosa | Dry | Zero | 1.8728131 | 0.6163805 | 6.848563 | 41 | 344 |
| Ahor-Urokosa | Wet | High | 2.1575267 | 0.7481184 | 6.271139 | 41 | 589 |
| Ahor-Urokosa | Wet | Mild | 2.6888726 | 0.8699131 | 6.952506 | 42 | 364 |
| Ahor-Urokosa | Wet | Zero | 2.3432148 | 0.7814845 | 7.247074 | 47 | 571 |
| Iguegosagie | Dry | High | 0.7884749 | 0.2541578 | 4.211169 | 29 | 772 |
| Iguegosagie | Dry | Mild | 1.2304508 | 0.4241651 | 4.068887 | 26 | 466 |
| Iguegosagie | Dry | Zero | 1.1388937 | 0.3810675 | 5.443507 | 37 | 745 |
| Iguegosagie | Wet | High | 2.8684601 | 0.8983082 | 8.118656 | 50 | 418 |
| Iguegosagie | Wet | Mild | 2.7632834 | 0.882069 | 7.054822 | 41 | 290 |
| Iguegosagie | Wet | Zero | 2.9508221 | 0.8995199 | 8.476418 | 50 | 324 |
| Iguovbiobo | Dry | High | 2.0478795 | 0.7007276 | 5.05788 | 32 | 459 |
| Iguovbiobo | Dry | Mild | 2.0097956 | 0.7557791 | 4.616605 | 31 | 664 |
| Iguovbiobo | Dry | Zero | 1.0765387 | 0.3594848 | 5.484187 | 41 | 1471 |
| Iguovbiobo | Wet | High | 2.485551 | 0.8338076 | 7.411494 | 47 | 496 |
| Iguovbiobo | Wet | Mild | 2.7264254 | 0.8680183 | 7.83363 | 47 | 355 |
| Iguovbiobo | Wet | Zero | 2.6250437 | 0.8585281 | 7.298933 | 45 | 415 |
| Ogua | Dry | High | 0.9352578 | 0.5345337 | 3.353381 | 25 | 1283 |
| Ogua | Dry | Mild | 1.0573671 | 0.3368169 | 5.850415 | 39 | 662 |
| Ogua | Dry | Zero | 1.8584905 | 0.7632317 | 3.993184 | 23 | 247 |
| Ogua | Wet | High | 2.8428775 | 0.8932125 | 6.882644 | 40 | 289 |
| Ogua | Wet | Mild | 2.545517 | 0.8230327 | 6.769844 | 39 | 274 |
| Ogua | Wet | Zero | 1.7251049 | 0.6152828 | 5.463176 | 30 | 202 |

**Effect of *Chromoleana* invasion gradient on arthropod diversity**

**Arthropod Abundance**

A generalized linear mixed model with a Poisson error distribution indicated that both season and infestation gradient significantly influenced arthropod abundance (Table X). Abundance was significantly lower in the wet season compared to the dry season (estimate = –0.66 ± 0.15 SE, z = –4.52, p < 0.001). Infestation gradient also had strong effects: mild infestation was associated with reduced abundance (estimate = –0.15 ± 0.02 SE, z = –6.66, p < 0.001), whereas high infestation corresponded to increased abundance (estimate = 0.19 ± 0.02 SE, z = 9.31, p < 0.001), relative to the baseline infestation level. Random effects suggested modest among-village variability (variance = 0.014), with a negative correlation (–0.50) between village-specific intercepts and the slope of season. Overall, the model explained clear seasonal and infestation-related shifts in abundance, with consistently lower counts during the wet season and contrasting effects of mild versus high infestation intensity.

**Family richness**

Generalized linear mixed model analysis showed that season significantly affected species richness, while infestation gradient had no detectable effect (Table X). Richness was higher in the wet season relative to the dry season (estimate = 0.30 ± 0.07 SE, z = 4.48, p < 0.001). In contrast, neither mild (estimate = –0.04 ± 0.08 SE, z = –0.48, p = 0.63) nor high infestation (estimate = –0.09 ± 0.08 SE, z = –1.10, p = 0.27) differed significantly from the baseline infestation level.

Random effects indicated minimal among-village variation in richness (variance = 0.0018, SD = 0.043). Overall, the model revealed a clear seasonal increase in richness during the wet season but no consistent relationship between infestation gradient and species richness.

**Shannon diversity index**

Shannon diversity was strongly influenced by season but not by infestation gradient (Table X). Diversity was significantly higher in the wet season compared to the dry season (estimate = 1.21 ± 0.18 SE, t = 6.81, p < 0.001). In contrast, neither mild (estimate = 0.12 ± 0.22 SE, t = 0.53, p = 0.60) nor high infestation (estimate = –0.10 ± 0.22 SE, t = –0.47, p = 0.65) differed significantly from the baseline infestation level.

The model explained a substantial proportion of variation in Shannon diversity (R-squared = 0.7) indicating that seasonal differences accounted for most of the explained variability. Overall, Shannon diversity was consistently elevated during the wet season, whereas infestation gradient showed no statistically significant relationship with diversity.

**Simpson diversity**

Simpson diversity was significantly affected by season but not by infestation gradient (Table X). Diversity was higher in the wet season compared to the dry season (estimate = 0.34 ± 0.06 SE, t = 5.55, p < 0.001). Neither mild (estimate = 0.02 ± 0.08 SE, t = 0.30, p = 0.77) nor high infestation (estimate = –0.02 ± 0.08 SE, t = –0.33, p = 0.75) differed significantly from the baseline infestation level. The model explained 61% variation in Simpson diversity. Overall, Simpson diversity was consistently greater during the wet season, while infestation gradient had no detectable influence.

**Margalef indix**

The Gamma regression model revealed that Season had a significant effect on Margalef’s diversity index, while Infestation gradient did not show strong evidence of an effect (Table X). Specifically, Margalef’s diversity was significantly higher during the wet season compared to the dry season (estimate = 0.41, SE = 0.07, t = 5.71, p < 0.001). In contrast, sites with mild (p = 0.65) or high infestation levels (p = 0.09) did not differ significantly from sites with low infestation.

**Igueosagie NMDS**

**Pitfall trap collections:**

Non-metric multidimensional scaling (NMDS) ordination based on Bray–Curtis dissimilarity revealed clear patterns of variation in arthropod community composition across Chromolaena infestation gradients and between seasons in Iguegosagie village. Arthropod assemblages varied markedly in response to both seasonality and infestation intensity, with the strongest dissimilarities observed between plots experiencing high Chromolaena infestation and those with low or no infestation.

The analysis of multivariate dispersion (PERMDISP) indicated significant differences in within-group variation among the combined season–infestation treatments (F = 7.37, p < 0.001), suggesting heterogeneity in community dispersion across treatments.

The PERMANOVA further confirmed these patterns, demonstrating that season and infestation jointly explained a substantial proportion of the variation in community composition (R² = 0.486, F = 15.88, p = 0.0001).

Pairwise comparisons provided additional resolution of these differences. Arthropod communities in plots with high Chromolaena infestation during the dry season were consistently distinct from most other groups, particularly from plots with high infestation in the wet season (F = 30.08, R² = 0.518, p.adjusted = 0.015), mild infestation in the wet season (F = 14.95, R² = 0.348, p.adjusted = 0.015), no infestation in the dry season (F = 3.50, R² = 0.111, p.adjusted = 0.045), and no infestation in the wet season (F = 19.79, R² = 0.414, p.adjusted = 0.015).

Similarly, arthropod assemblages in plots with high Chromolaena infestation during the wet season differed significantly from nearly all other treatments. These differences were especially pronounced when compared with mild infestation in the dry season (F = 23.68, R² = 0.458, p.adjusted = 0.015), mild infestation in the wet season (F = 5.65, R² = 0.168, p.adjusted = 0.015), no infestation in the dry season (F = 24.88, R² = 0.471, p.adjusted = 0.015), and no infestation in the wet season (F = 9.82, R² = 0.260, p.adjusted = 0.015).

Comparisons among low- and mild-infestation plots showed more subtle differences. For instance, arthropod communities in mildly infested plots during the dry season were not significantly different from those in uninfested plots during the dry season (p.adjusted = 0.660). However, they were distinct from communities in mildly infested plots during the wet season (F = 12.18, R² = 0.303, p.adjusted = 0.015) and from those in uninfested wet-season plots (F = 14.16, R² = 0.336, p.adjusted = 0.015). Likewise, arthropod assemblages in mildly infested wet-season plots were significantly different from those in uninfested wet-season plots (F = 10.08, R² = 0.265, p.adjusted = 0.015).

Taken together, these results demonstrate that both seasonality and Chromolaena infestation strongly shape arthropod community composition, with the most pronounced differences observed under conditions of high infestation.

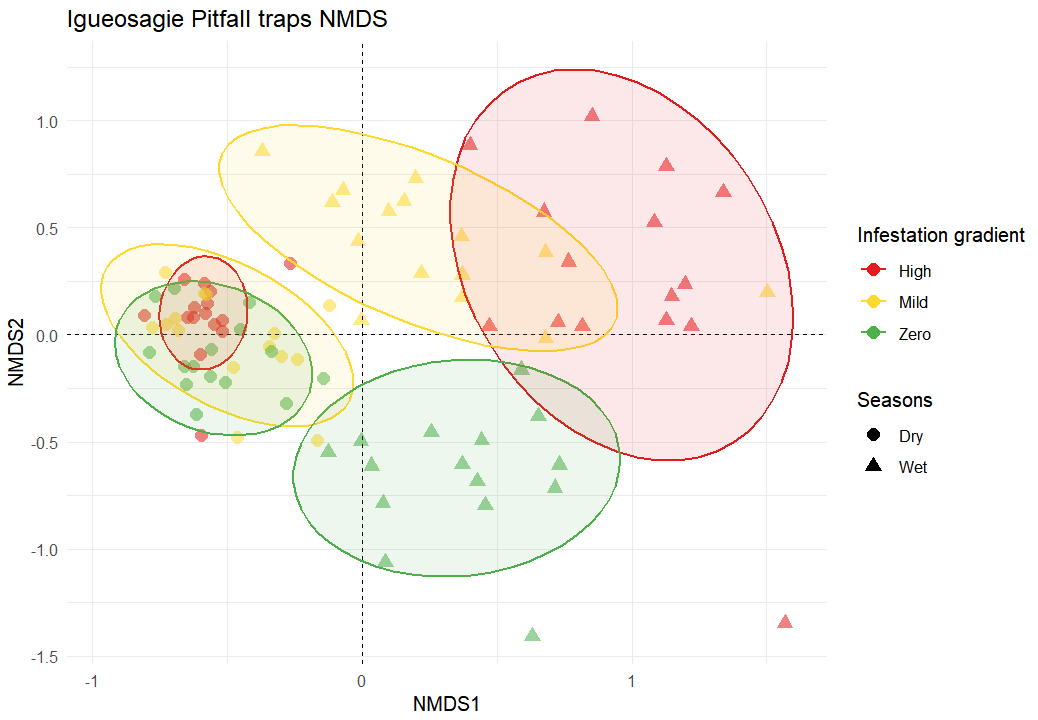


Figure \_:

**Beating Tray Collections:**

**# Results and analysis for beating tray collection should not be trusted.**

Analysis of arthropods collected via beating trays showed that community composition varied across season and *Chromolaena* infestation intensity. The results suggest that arthropod assemblages collected via beating trays are strongly influenced by both seasonality and Chromolaena infestation intensity, with the most pronounced compositional differences occurring under high infestation, particularly when contrasting dry- and wet-season conditions.Examination of multivariate dispersion (PERMDISP) indicated no significant differences in within-group variability among the combined season–infestation treatments (F = 0.84, p = 0.53), suggesting that the spread of community data within each treatment was relatively homogeneous.

Despite the lack of dispersion differences, PERMANOVA revealed a significant effect of season and infestation on arthropod assemblages, with the model explaining approximately 24% of the observed variation in community structure (R² = 0.238, F = 3.38, p = 0.0001). This indicates that arthropod communities were structured by both seasonal changes and the level of Chromolaena infestation.

Pairwise comparisons highlighted which treatments were most distinct. Communities in plots with high Chromolaena infestation during the dry season differed significantly from those in high infestation during the wet season (F = 5.52, R² = 0.235, p.adjusted = 0.015), mild infestation during the wet season (F = 7.07, R² = 0.282, p.adjusted = 0.015), and no infestation during the wet season (F = 9.03, R² = 0.334, p.adjusted = 0.015). Similarly, high infestation in the wet season plots were distinct from communities in mildly infested dry-season plots (F = 4.17, R² = 0.188, p.adjusted = 0.015), mildly infested wet-season plots (F = 3.15, R² = 0.149, p.adjusted = 0.030), and plots with no infestation during the wet season (F = 5.36, R² = 0.230, p.adjusted = 0.015).

More subtle differences were observed among low- and mild-infestation plots. For example, mild infestation in the dry season was not significantly different from uninfested dry-season plots (p.adjusted = 1.0), but differed from uninfested wet-season plots (F = 8.13, R² = 0.311, p.adjusted = 0.015). Likewise, mild infestation in the wet season differed from uninfested dry-season plots (F = 4.51, R² = 0.200, p.adjusted = 0.015), though differences between mild and uninfested wet-season plots were not significant (p.adjusted = 0.242).

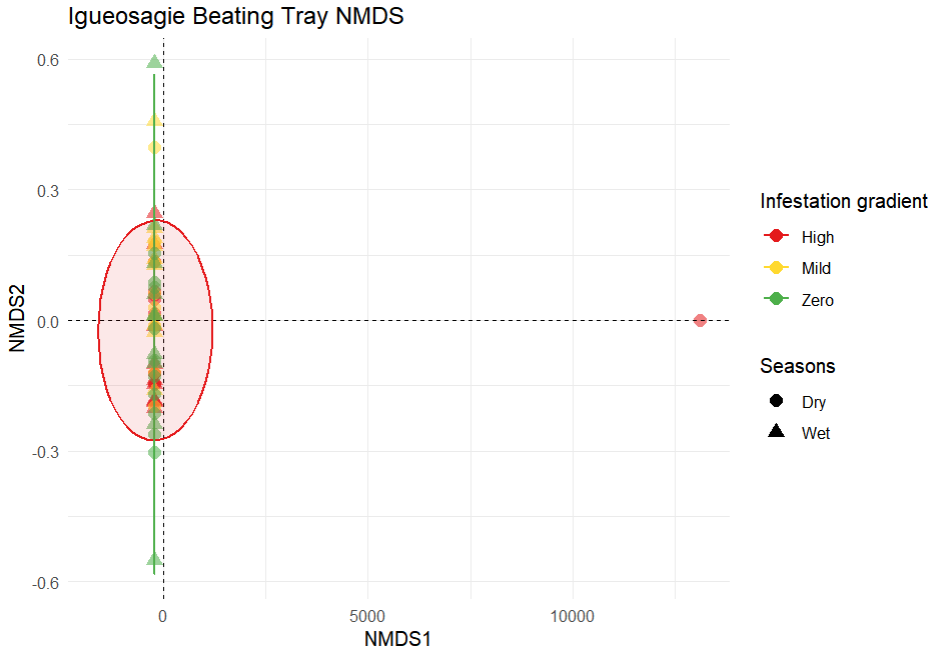


Figure \_ :

**Ogua NMDS**

**Pitfall trap collections:**

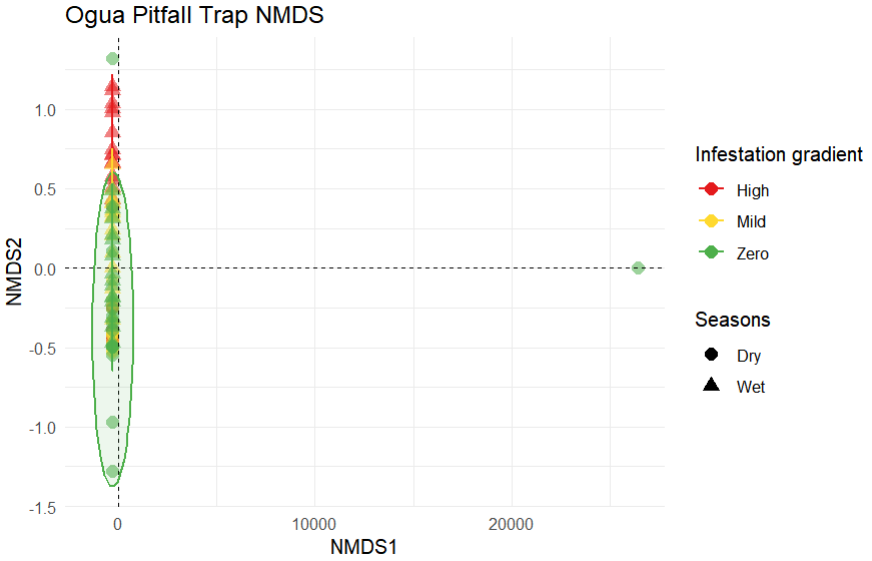
**# Results and analysis for pitfall trap collection should not be trusted.**

Pitfall trap collections in Ogua village revealed significant variation in arthropod community composition in response to season and Chromolaena infestation intensity. Analysis of multivariate dispersion (PERMDISP) indicated that within-group variability differed significantly among the combined season–infestation treatments (F = 3.56, p = 0.006), suggesting heterogeneity in community spread across treatments.

PERMANOVA confirmed that both season and infestation significantly influenced pitfall-trap arthropod assemblages, explaining approximately 28% of the variation in community composition (R² = 0.284, F = 6.65, p < 0.001). This demonstrates that arthropod communities are structured by both seasonal dynamics and the level of *Chromolaena* infestation.

Pairwise comparisons provided more detailed insight. Communities in plots with high *Chromolaena* infestation during the dry season were significantly distinct from high infestation in the wet season (F = 18.94, R² = 0.403, p.adjusted = 0.015), mild infestation in the wet season (F = 10.67, R² = 0.276, p.adjusted = 0.015), and uninfested wet-season plots (F = 8.73, R² = 0.238, p.adjusted = 0.015). In contrast, high infestation in the wet season was also distinct from dry mild (F = 18.72, R² = 0.401, p.adjusted = 0.015), wet mild (F = 5.19, R² = 0.156, p.adjusted = 0.015), dry zero (F = 8.42, R² = 0.231, p.adjusted = 0.015), and wet zero plots (F = 9.47, R² = 0.253, p.adjusted = 0.015).

Communities in mild- or zero-infestation plots showed more subtle differences. For instance, dry mild plots differed significantly from wet mild (F = 10.39, R² = 0.271, p.adjusted = 0.015) and wet zero (F = 8.08, R² = 0.224, p.adjusted = 0.015), whereas comparisons such as dry mild vs dry zero were not significant (p.adjusted = 0.120). Overall, these results indicate that high Chromolaena infestation during the dry season drives the largest compositional differences, while mild or no infestation generally results in more similar arthropod assemblages.



**Beating tray collections:**

Arthropod communities sampled using beating trays in Ogua village showed significant variation across season and Chromolaena infestation intensity. The results demonstrate that arthropod assemblages collected by beating trays are strongly influenced by the interaction of seasonality and Chromolaena infestation intensity, with the greatest divergence observed under high infestation in the dry season.

The analysis of multivariate dispersion (PERMDISP) indicated that within-group variability differed significantly among the combined season–infestation treatments (F = 4.37, p = 0.002), suggesting heterogeneity in the spread of community data across treatments.

PERMANOVA confirmed that both season and infestation significantly influenced arthropod assemblages, explaining approximately 27% of the total variation in community composition (R² = 0.270, F = 3.85, p = 0.0001). This indicates that beating-tray-collected arthropod communities were structured by both seasonal dynamics and the level of Chromolaena infestation.

Pairwise comparisons further clarified these patterns. Communities in plots with high Chromolaena infestation during the dry season were significantly distinct from those with high infestation during the wet season (F = 18.62, R² = 0.509, p.adjusted = 0.015), mild infestation in the dry season (F = 6.87, R² = 0.276, p.adjusted = 0.030), mild infestation in the wet season (F = 18.49, R² = 0.507, p.adjusted = 0.015), uninfested dry-season plots (F = 16.12, R² = 0.502, p.adjusted = 0.015), and uninfested wet-season plots (F = 34.79, R² = 0.659, p.adjusted = 0.015).

In contrast, communities in high infestation wet-season plots were generally not significantly different from mildly infested or uninfested plots within the same season (p.adjusted > 0.3), indicating that the combination of high infestation and dry-season conditions drove the largest compositional differences. Comparisons among low- and mild-infestation plots showed smaller and mostly non-significant differences, suggesting that pitfall-trap communities were more resilient to mild infestation or seasonal changes alone.

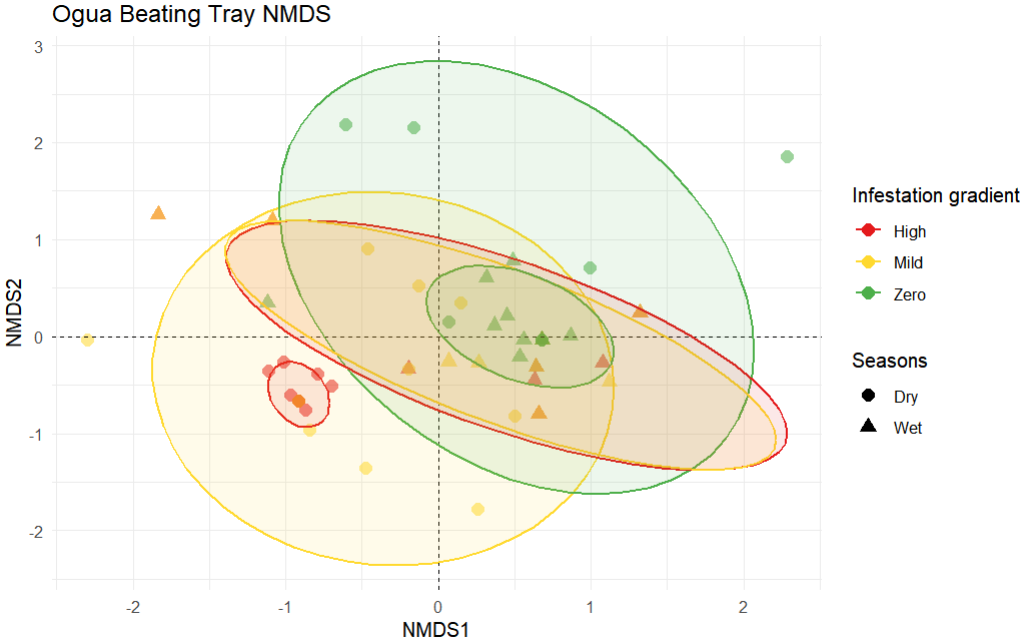


Figure \_

**Iguovbiobo NMDS**

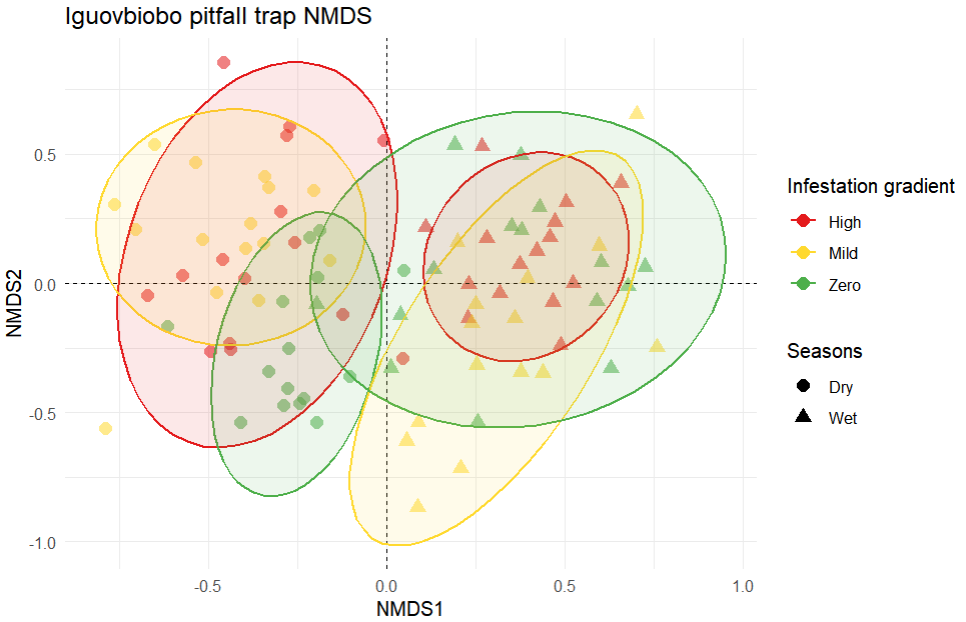
**Pitfall trap collection:**

Pitfall trap collections in Iguovbiobo village indicated significant variation in arthropod community composition across both season and Chromolaena infestation intensity. The findings indicate that high Chromolaena infestation in both dry and wet seasons drives the greatest compositional differences in pitfall-trap arthropod communities, whereas mild or absent infestation results in more similar assemblages. Analysis of multivariate dispersion (PERMDISP) revealed significant differences in within-group variability among the combined season–infestation treatments (F = 3.12, p = 0.012), suggesting heterogeneous community dispersion across treatments.

Permutation-based multivariate analysis of variance (PERMANOVA) confirmed that season and infestation significantly structured pitfall-trap arthropod assemblages, explaining approximately 35% of the variation in community composition (R² = 0.352, F = 9.12, p < 0.001). These results indicate that both the dry and wet seasons, in combination with varying levels of *Chromolaena* infestation, have a strong influence on arthropod assemblages.

Pairwise comparisons provided finer resolution of these patterns. Communities in dry-season plots with high infestation were significantly distinct from wet-season high infestation plots (F = 12.38, R² = 0.307, p.adjusted = 0.015), wet-season mild infestation (F = 7.29, R² = 0.207, p.adjusted = 0.015), dry-season zero infestation (F = 5.91, R² = 0.174, p.adjusted = 0.015), and wet-season zero infestation (F = 7.50, R² = 0.211, p.adjusted = 0.015). Likewise, wet-season high infestation plots differed significantly from dry mild (F = 18.33, R² = 0.396, p.adjusted = 0.015) and dry zero (F = 14.77, R² = 0.345, p.adjusted = 0.015) plots.

Subtle differences were observed among plots with mild or zero infestation. For instance, dry mild plots were distinct from wet mild (F = 12.74, R² = 0.313, p.adjusted = 0.015), dry zero (F = 12.73, R² = 0.312, p.adjusted = 0.015), and wet zero plots (F = 12.33, R² = 0.306, p.adjusted = 0.015). In contrast, wet mild and wet zero plots did not differ significantly (p.adjusted = 1.000).



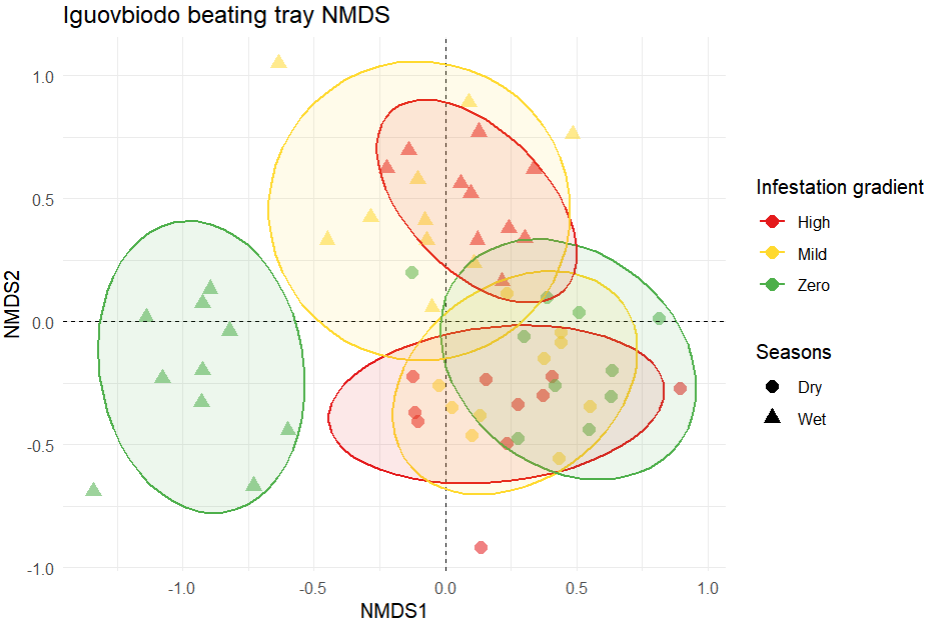
**Beating tray collection:**

Beating tray collections in Iguovbiobo village showed significant variation in arthropod community composition across both season and Chromolaena infestation intensity. The results show that high Chromolaena infestation consistently drives the greatest changes in arboreal arthropod community composition in both dry and wet seasons, whereas mild or absent infestation results in more similar assemblages Analysis of multivariate dispersion (PERMDISP) indicated no significant differences in within-group dispersion among the combined season–infestation treatments (F = 1.10, p = 0.373), suggesting that community variability was relatively homogeneous across groups.

Permutation-based multivariate analysis of variance (PERMANOVA) revealed a significant influence of season and infestation on arthropod assemblages, explaining approximately 44% of the total variation in community composition (R² = 0.436, F = 8.36, p < 0.001). This indicates that both seasonal conditions and Chromolaena infestation levels strongly structure the arboreal arthropod communities sampled with beating trays.

Pairwise comparisons highlighted the patterns of community differentiation. Arthropod assemblages in dry-season plots with high infestation were significantly different from wet-season high infestation plots (F = 11.93, R² = 0.399, p.adjusted = 0.015), wet mild infestation (F = 8.06, R² = 0.309, p.adjusted = 0.015), dry zero infestation (F = 3.17, R² = 0.150, p.adjusted = 0.045), and wet zero infestation (F = 16.15, R² = 0.473, p.adjusted = 0.015). Similarly, wet-season high infestation plots differed significantly from dry mild (F = 10.60, R² = 0.371, p.adjusted = 0.015), dry zero (F = 8.55, R² = 0.322, p.adjusted = 0.015), and wet zero plots (F = 19.21, R² = 0.516, p.adjusted = 0.015).

Communities in plots with mild or no infestation also showed distinct patterns. Dry mild plots differed from wet mild (F = 7.58, R² = 0.296, p.adjusted = 0.015) and wet zero plots (F = 21.11, R² = 0.540, p.adjusted = 0.015), while wet mild plots differed from dry zero (F = 7.40, R² = 0.291, p.adjusted = 0.015) and wet zero plots (F = 11.14, R² = 0.382, p.adjusted = 0.015). All other pairwise comparisons, including dry mild vs dry zero, were not statistically significant (p.adjusted > 0.05).



**Ahor Urokosa NMDS**

**Pitfall trap collection:**

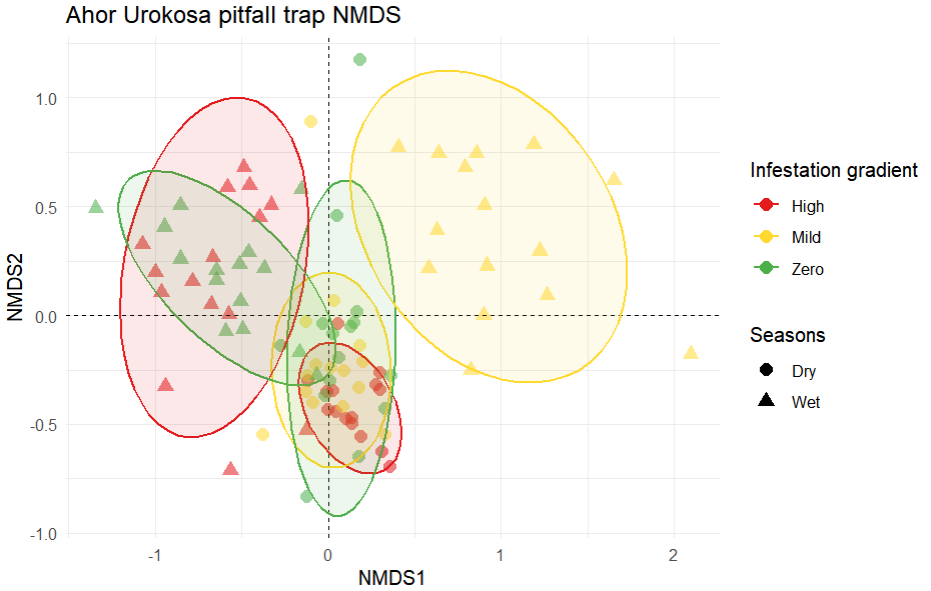
Pitfall trap collections in Ahor Urokosa revealed significant variation in arthropod community composition across both season and Chromolaena infestation intensity. Analysis of multivariate dispersion (PERMDISP) indicated significant differences in within-group dispersion among the combined season–infestation groups (F = 5.82, p < 0.001), suggesting heterogeneity in community variability across treatments.

PERMANOVA confirmed that season and infestation had a strong effect on arthropod assemblages, explaining 43% of the observed variation in community structure (R² = 0.431, F = 12.75, p < 0.001). This indicates that both seasonal conditions and infestation intensity significantly structure the ground-dwelling arthropod communities sampled with pitfall traps.

Pairwise comparisons showed that dry-season plots with high infestation were distinct from almost all other groups, including wet high infestation (F = 25.03, R² = 0.472, p.adjusted = 0.015), wet mild (F = 24.83, R² = 0.470, p.adjusted = 0.015), wet zero (F = 24.91, R² = 0.471, p.adjusted = 0.015), dry mild (F = 4.70, R² = 0.144, p.adjusted = 0.015), and dry zero (F = 4.83, R² = 0.147, p.adjusted = 0.015). Similarly, wet high infestation plots differed from dry mild (F = 12.46, R² = 0.308, p.adjusted = 0.015), wet mild (F = 18.84, R² = 0.402, p.adjusted = 0.015), dry zero (F = 12.75, R² = 0.313, p.adjusted = 0.015), and wet zero plots (F = 3.12, R² = 0.100, p.adjusted = 0.030).

Communities in plots with mild or no infestation also differed in some cases. Dry mild plots differed from wet mild (F = 17.71, R² = 0.387, p.adjusted = 0.015) and wet zero plots (F = 11.73, R² = 0.295, p.adjusted = 0.015), while wet mild plots differed from dry zero (F = 13.39, R² = 0.324, p.adjusted = 0.015) and wet zero (F = 21.43, R² = 0.434, p.adjusted = 0.015). The comparison between dry mild and dry zero was not significant (p.adjusted = 1.000).

These results indicate that high Chromolaena infestation consistently drives the largest shifts in ground-dwelling arthropod community composition, while mild or absent infestation results in more similar assemblages. Seasonal differences further modulate these community patterns.



**Beating tray collection:**

Beating tray collections in Ahor Urokosa revealed significant differences in arthropod community composition across season–infestation combinations. The findings suggest that high infestation levels strongly influence the composition of foliage-dwelling arthropod communities, and seasonal effects modulate these patterns. Plots with mild or no infestation generally exhibited more similar communities.

Analysis of multivariate dispersion (PERMDISP) indicated significant heterogeneity among groups (F = 2.98, p = 0.019), suggesting variation in within-group community variability across treatments.

PERMANOVA results confirmed a significant effect of season and infestation on arthropod assemblages, with 29.4% of the variation explained by these factors (R² = 0.294, F = 4.50, p < 0.001).

Pairwise comparisons indicated that dry high infestation plots differed from most other groups, including wet high infestation (F = 19.92, R² = 0.525, p.adjusted = 0.015), wet mild (F = 8.87, R² = 0.330, p.adjusted = 0.015), dry zero (F = 3.15, R² = 0.149, p.adjusted = 0.045), and wet zero (F = 7.36, R² = 0.290, p.adjusted = 0.015).

Other significant pairwise differences included wet high infestation vs dry mild (F = 10.14, R² = 0.360, p.adjusted = 0.015), wet high vs dry zero (F = 9.07, R² = 0.335, p.adjusted = 0.015), and dry mild vs wet mild (F = 4.48, R² = 0.199, p.adjusted = 0.015). Some comparisons, such as dry mild vs dry zero and wet mild vs wet zero, were not significant after adjustment (p.adjusted = 1.000 and 0.069, respectively).

