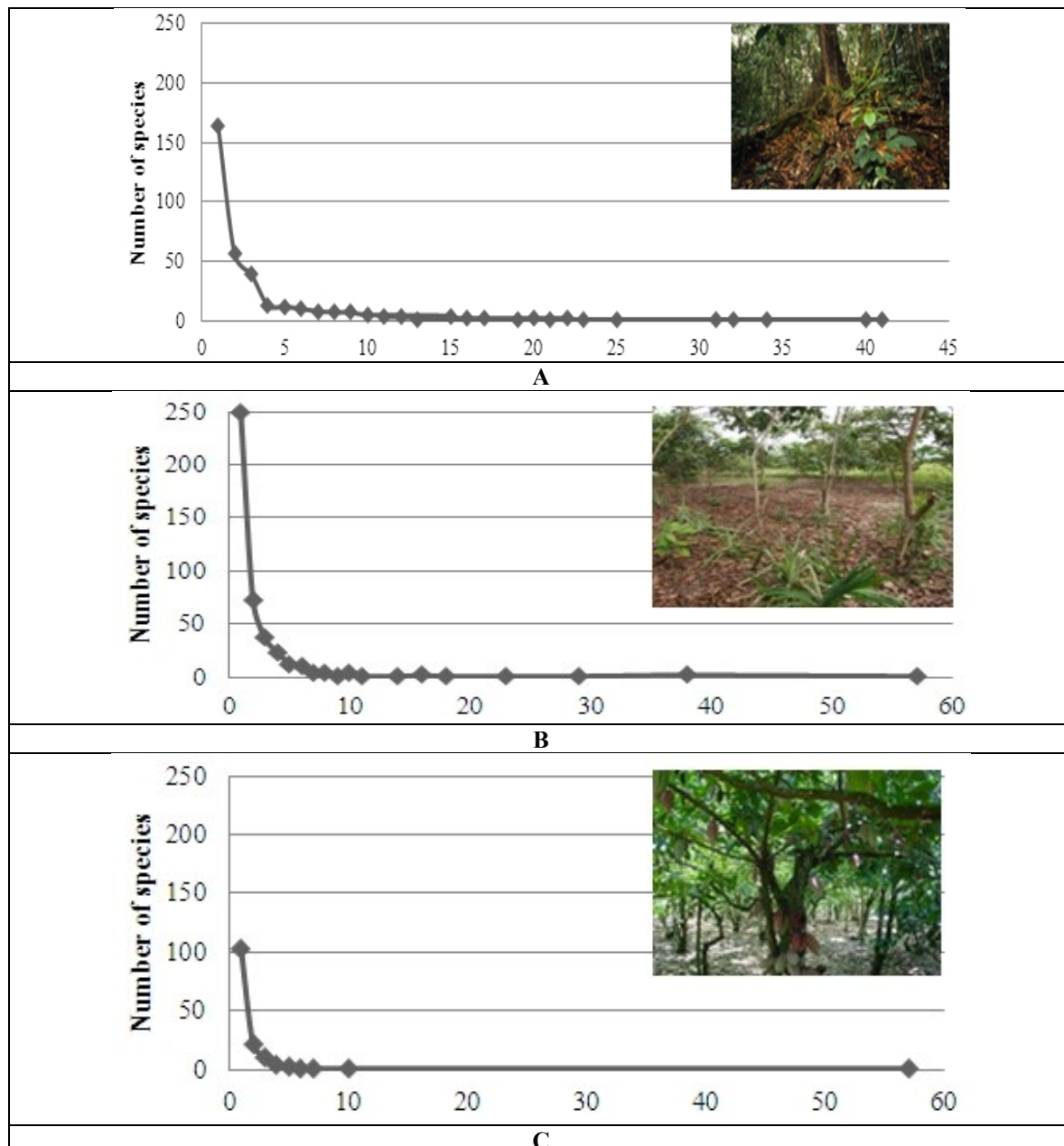
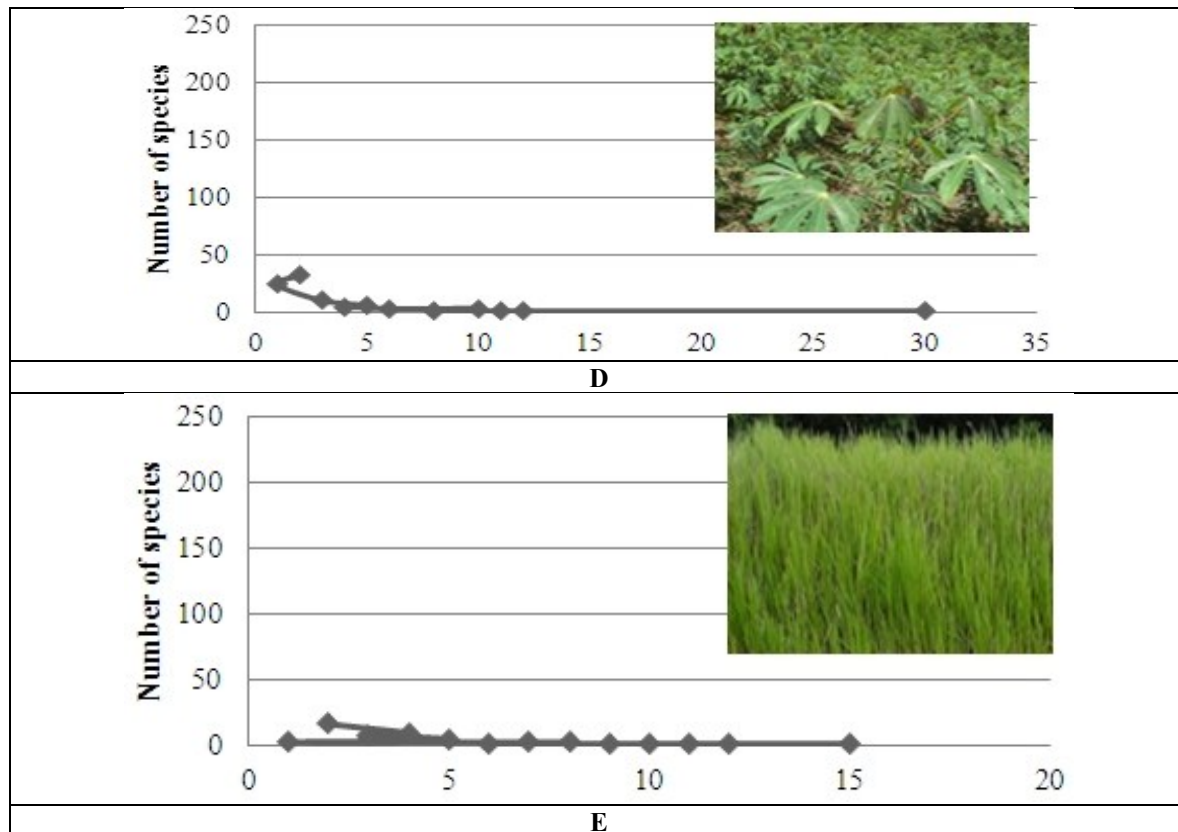


# Supplementary Materials: How natural Forest Conversion Affects Insect Biodiversity in the Peruvian Amazon: Can Agroforestry Help?

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Supplementary material S1. Relative abundance models for (A) natural forests; (B) multistrata agroforests; (C) cocoa agroforests; (D) annual monoculture crops; (E) weedy grasslands.





Supplementary materials S2. Details of statistical analysis of insect diversity indices: parametric statistics—one-way ANOVA with multiple comparisons via Bonferroni tests. Observed species richness per plot/sample

Table S1: Number of species per plot—ANOVA results.

| Effect     | One-way Analysis of Variance |     |           |          |                 |
|------------|------------------------------|-----|-----------|----------|-----------------|
|            | SS                           | df  | MS        | F        | <i>p</i> -Value |
| Abs.member | 80,159.77                    | 1   | 80,159.77 | 3027.786 | 0.00            |
| variant    | 81,385.57                    | 4   | 20346.39  | 768.522  | 0.00            |
| Error      | 3468.19                      | 131 | 26.47     |          |                 |

SS: Sum of squares , df: degrees of freedom, MS: Mean of Squares, F: F-statistic.

Table S2: Number of species per plot—multiple comparisons. Homogeneous Groups.

| Bonferroni Test; Variable No of Species per plot. Homogeneous Group, alfa = 0.05000 |                                |      |      |      |  |
|-------------------------------------------------------------------------------------|--------------------------------|------|------|------|--|
| Variant                                                                             | No of Species per plot Average | 1    | 2    | 3    |  |
| 5 W                                                                                 | 3.0625                         | **** |      |      |  |
| 4 MC                                                                                | 4.1250                         | **** |      |      |  |
| 3 CF                                                                                | 6.7188                         | **** |      |      |  |
| 2 AFS                                                                               | 18.7813                        |      | **** |      |  |
| 1 PF                                                                                | 108.8750                       |      |      | **** |  |

W: weedy grassland, MC: monoculture (annual monoculture crops), CF: Cocoa forests (Cocoa Agroforests), AFS: Agroforestry (Multistrata Agroforests), PF: Primary Forests (Natural Forests).\*\*\*\*: categories marked in the same column do not statistically differ one from another

Table S3: Number of species per plot—multiple comparisons. *P*-values of Post-hoc Tests (Bonferroni).

| Bonferroni Test; variable: No of Species per plot. Probabilities for Post-hoc Tests |         |            |            |            |            |            |
|-------------------------------------------------------------------------------------|---------|------------|------------|------------|------------|------------|
|                                                                                     | variant | {1} 108.88 | {2} 18.781 | {3} 6.7188 | {4} 4.1250 | {5} 3.0625 |
| 1                                                                                   | PF      |            | 0.000000   | 0.000000   | 0.000000   | 0.000000   |
| 2                                                                                   | AFS     | 0.00       |            | 0.000000   | 0.000000   | 0.000000   |
| 3                                                                                   | CF      | 0.00       | 0.000000   |            | 0.458048   | 0.051958   |
| 4                                                                                   | MC      | 0.00       | 0.000000   | 0.458048   |            | 1.000000   |
| 5                                                                                   | W       | 0.00       | 0.000000   | 0.051958   | 1.000000   |            |

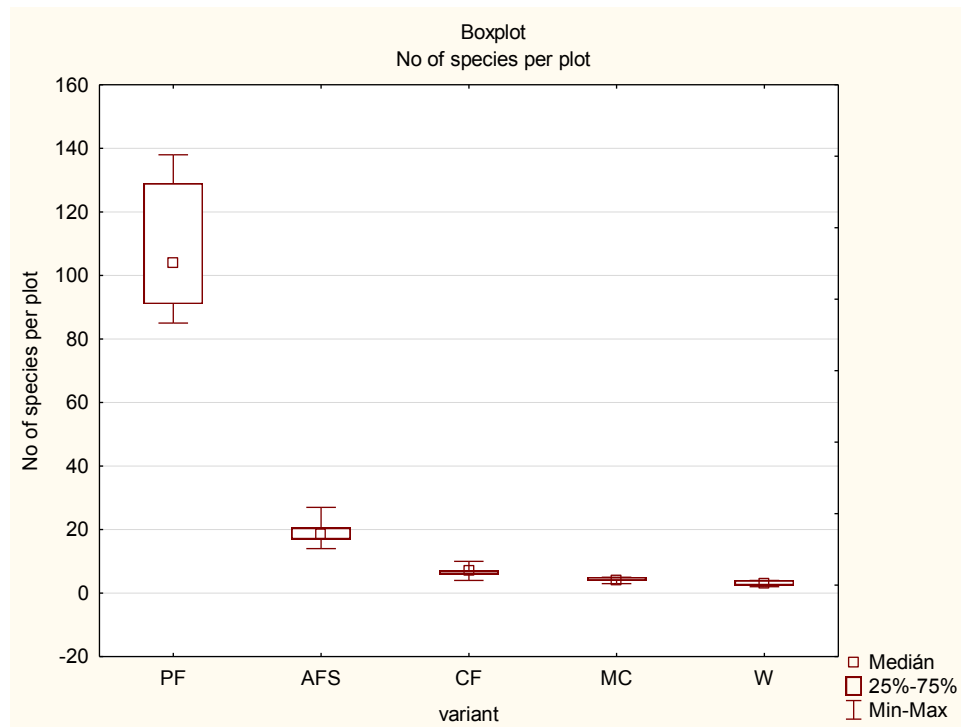


Figure S1. Number of species per plot—Box plots for particular habitats.

Table S4: Shannon-Weiner diversity index—ANOVA results.

| Effect      | One-way Analysis of Variance |     |          |          |                 |
|-------------|------------------------------|-----|----------|----------|-----------------|
|             | SS                           | df  | MS       | F        | <i>p</i> -Value |
| Abs. member | 6.494534                     | 1   | 6.494534 | 2825.047 | 0.00            |
| Variant     | 1.852792                     | 4   | 0.463198 | 201.486  | 0.00            |
| Error       | 0.301157                     | 131 | 0.002299 |          |                 |

Table S5: Shannon-Weiner diversity index—multiple comparisons. Homogeneous Groups.

| Bonferroni Test; Variable Shanon-Weiner Index. Homogeneous Group, alfa = .05000 |                                        |          |      |      |      |
|---------------------------------------------------------------------------------|----------------------------------------|----------|------|------|------|
| Variant                                                                         | Shannon-Weiner Diversity Index Average |          | 1    | 2    | 3    |
| 5                                                                               | W                                      | 0.138813 | **** |      |      |
| 4                                                                               | MC                                     | 0.141250 | **** |      |      |
| 3                                                                               | CF                                     | 0.166094 | **** | **** |      |
| 2                                                                               | AFS                                    | 0.180563 |      | **** |      |
| 1                                                                               | PF                                     | 0.647500 |      |      | **** |

Table S6: Shannon-Weiner diversity index—multiple comparisons. *P*-values of Post-hoc Tests (Bonferroni).

| Bonferroni Test; Variable: No of Species per plot. Probabilities for Post-hoc Tests |         |             |             |             |             |             |
|-------------------------------------------------------------------------------------|---------|-------------|-------------|-------------|-------------|-------------|
|                                                                                     | Variant | {1} 0.64750 | {2} 0.18056 | {3} 0.16609 | {4} 0.14125 | {5} 0.13881 |
| 1                                                                                   | PF      |             | 0.000000    | 0.000000    | 0.000000    | 0.000000    |
| 2                                                                                   | AFS     | 0.00        |             | 1.000000    | 0.013316    | 0.006745    |
| 3                                                                                   | CF      | 0.00        | 1.000000    |             | 0.401699    | 0.244718    |
| 4                                                                                   | MC      | 0.00        | 0.013316    | 0.401699    |             | 1.000000    |
| 5                                                                                   | W       | 0.00        | 0.006745    | 0.244718    | 1.000000    |             |

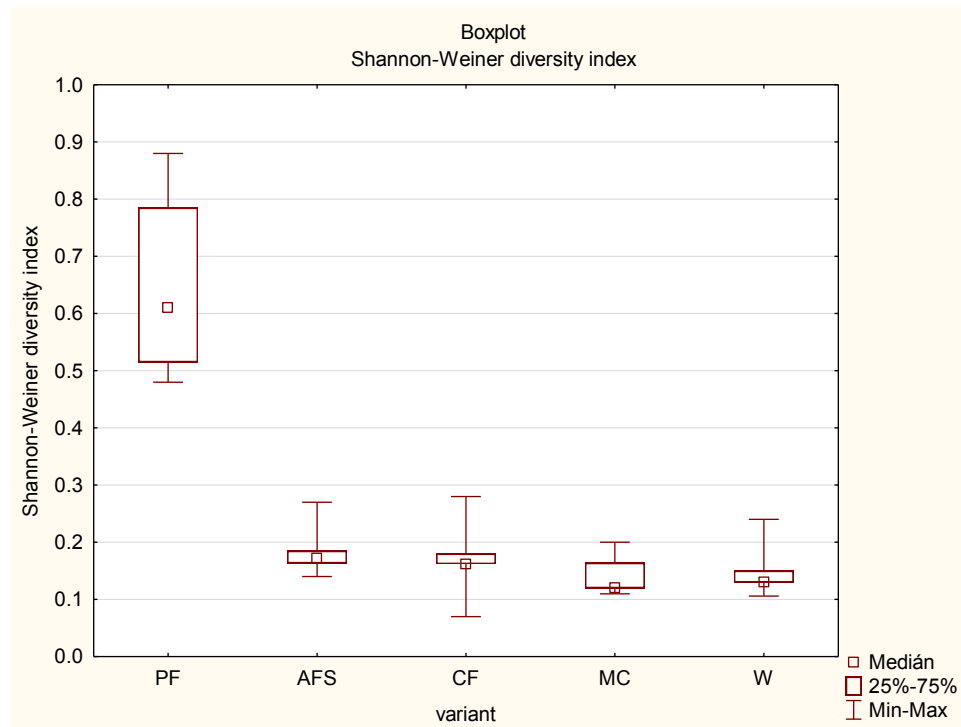


Figure S2. Shannon-Weiner diversity index—Box plots for particular habitats.

Table S7: Jackknife estimate of sp. Richness—ANOVA results.

| Effect      | One-way Analysis of Variance |     |          |          |                 |
|-------------|------------------------------|-----|----------|----------|-----------------|
|             | SS                           | df  | MS       | F        | <i>p</i> -Value |
| Abs. member | 143073.1                     | 1   | 143073.1 | 2960.649 | 0.00            |
| Variant     | 152513.9                     | 4   | 38128.5  | 789.002  | 0.00            |
| Error       | 6330.6                       | 131 | 48.3     |          |                 |

Table S8: Jackknife estimate of sp. Richness—multiple comparisons. Homogeneous Groups.

| Bonferroni test; variable Shanon—Weiner index. Homogeneous group, alfa = 0.05000 |         |                              |      |      |      |      |
|----------------------------------------------------------------------------------|---------|------------------------------|------|------|------|------|
|                                                                                  | Variant | Jacknife sp. Richness Průměr | 1    | 2    | 3    | 4    |
| 5                                                                                | W       | 3.3438                       | **** |      |      |      |
| 4                                                                                | MC      | 4.7188                       | **** | **** |      |      |
| 3                                                                                | CF      | 8.3750                       |      | **** |      |      |
| 2                                                                                | AFS     | 24.4375                      |      |      | **** |      |
| 1                                                                                | PF      | 148.2500                     |      |      |      | **** |

Table S9: Jackknife estimate of sp. Richness—multiple comparisons. P-values of Post-hoc Tests (Bonferroni).

| Bonferroni Test; Variable: No of Species per plot. Probabilities for Post-hoc Tests |         |            |            |            |            |            |
|-------------------------------------------------------------------------------------|---------|------------|------------|------------|------------|------------|
|                                                                                     | Variant | {1} 148.25 | {2} 24.437 | {3} 8.3750 | {4} 4.7188 | {5} 3.3438 |
| 1                                                                                   | PF      |            | 0.000000   | 0.000000   | 0.000000   | 0.000000   |
| 2                                                                                   | AFS     | 0.00       |            | 0.000000   | 0.000000   | 0.000000   |
| 3                                                                                   | CF      | 0.00       | 0.000000   |            | 0.373051   | 0.044434   |
| 4                                                                                   | MC      | 0.00       | 0.000000   | 0.373051   |            | 1.000000   |
| 5                                                                                   | W       | 0.00       | 0.000000   | 0.044434   | 1.000000   |            |

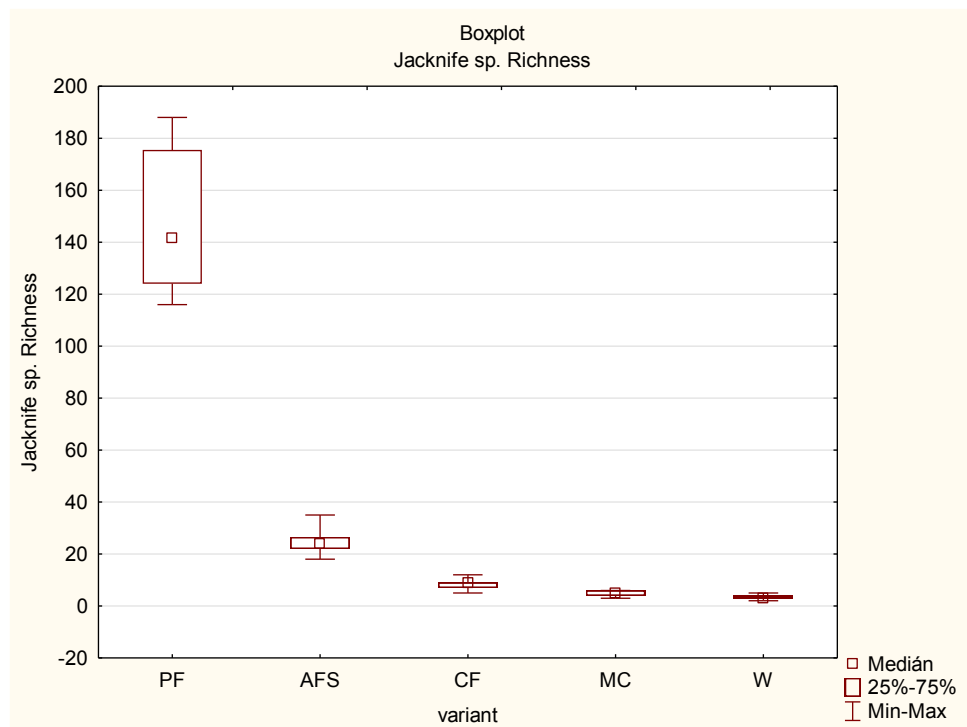


Figure S3. Jackknife estimate of sp. Richness—Box plots for particular habitats.

Table S10: Simpson diversity index (1-D)—ANOVA results.

| Effect      | One-way Analysis of Variance |     |          |          |         |
|-------------|------------------------------|-----|----------|----------|---------|
|             | SS                           | df  | MS       | F        | p-Value |
| Abs. member | 56.60964                     | 1   | 56.60964 | 13105.52 | 0.00    |
| variant     | 2.67138                      | 4   | 0.66785  | 154.61   | 0.00    |
| Error       | 0.56586                      | 131 | 0.00432  |          |         |

Table S11: Simpson diversity index (1-D)—multiple comparisons. Homogeneous Groups.

| Bonferroni Test; Variable Shanon-Weiner index. Homogeneous Group, alfa = 0.05000 |         |                                       |      |      |      |      |
|----------------------------------------------------------------------------------|---------|---------------------------------------|------|------|------|------|
|                                                                                  | variant | Simpson Diversity index (1-D) Average | 1    | 2    | 3    | 4    |
| 5                                                                                | W       | 0.554438                              |      | **** |      |      |
| 4                                                                                | MC      | 0.606875                              |      |      | **** |      |
| 3                                                                                | CF      | 0.808781                              |      |      |      | **** |
| 2                                                                                | AFS     | 0.883000                              | **** |      |      |      |
| 1                                                                                | PF      | 0.908875                              | **** |      |      |      |

Table S12: Simpson diversity index (1-D)—multiple comparisons. *P*-values of Post-hoc Tests (Bonferroni).

| Bonferroni Test; Variable: No of Species per plot. Probabilities for Post-hoc Tests |         |             |             |             |             |             |
|-------------------------------------------------------------------------------------|---------|-------------|-------------|-------------|-------------|-------------|
|                                                                                     | Variant | {1} 0.90888 | {2} 0.88300 | {3} 0.80878 | {4} 0.60688 | {5} 0.55444 |
| 1                                                                                   | PF      |             | 1.000000    | 0.001820    | 0.000000    | 0.000000    |
| 2                                                                                   | AFS     | 1.000000    |             | 0.000138    | 0.000000    | 0.000000    |
| 3                                                                                   | CF      | 0.001820    | 0.000138    |             | 0.000000    | 0.000000    |
| 4                                                                                   | MC      | 0.000000    | 0.000000    | 0.000000    |             | 0.017724    |
| 5                                                                                   | W       | 0.000000    | 0.000000    | 0.000000    | 0.017724    |             |

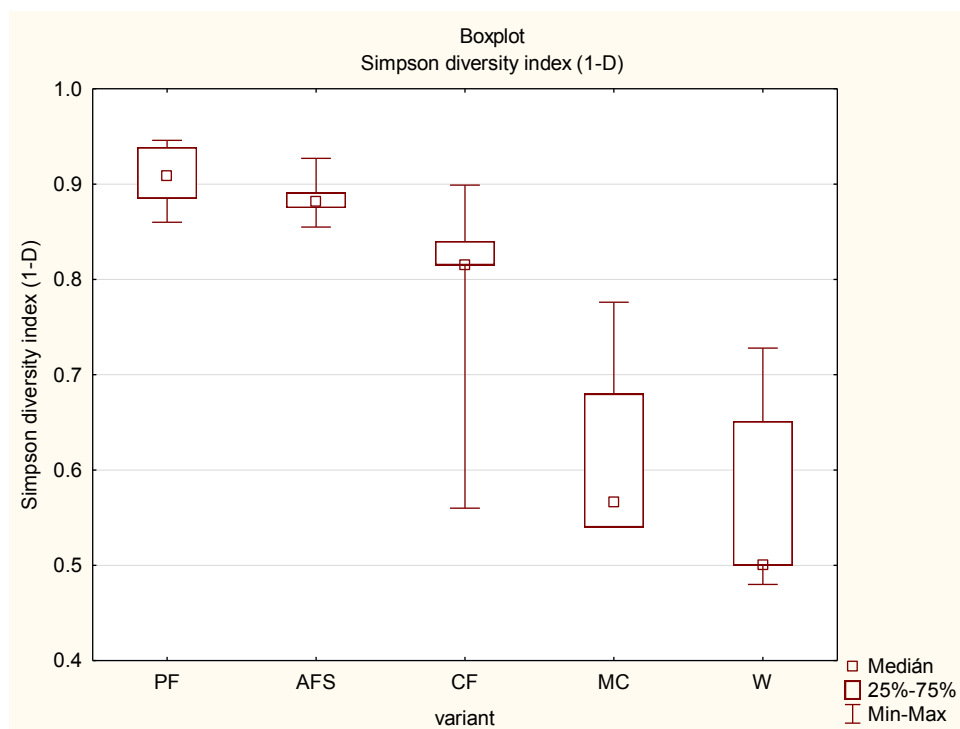


Figure S4. Simpson diversity index (1-D)—Box plots for particular habitats.