

**Table S1.** Type of management in each agronomic system at the two study sites.

Type of management	Annual number				
	Caaguazú		Itapúa		
	Conventional	Agroecological	Conventional	Traditional	Agroecological
Mechanical tillage (tractor) <sup>a</sup>	1	0	1	0	0
Pyrethroid pesticide application (1.25 cc per 50 m <sup>2</sup> plot)	2	0	2	1	0
Glyphosate application (16.25 cc per 50 m <sup>2</sup> plot)	2	0	2	1	0
Mechanical (motorized) brush cutter <sup>b</sup>	1	1	1	1	1
Manual weeding	0	1	0	0	1
Cow manure application (1 kg/m <sup>2</sup> plot) <sup>a</sup>	0	1	0	0	1
Tree pruning <sup>c</sup>	1	1	1	1	1
Planting of <i>Ilex paraguariensis</i>	5	5	13	13	13
Harvest of <i>Ilex paraguariensis</i> <sup>d</sup>	1	1	1	1	1

<sup>a</sup> Only in year 1; <sup>b</sup> From year 2; <sup>c</sup> In years 2, 3, and 4; <sup>d</sup> Cutting branches from year 3.

**Table S2.** Initial average height measurements (m) of individuals planted in different experimental plots (p).

A – Caaguazú

Species	Conventional system									Agroecological system								
	Pathside			Field edge			Islet			Pathside			Field edge			Islet		
	p1	p2	p3	p1	p2	p3	p1	p2	p3	p1	p2	p3	p1	p2	p3	p1	p2	p3
<i>Cordia trichotoma</i>	0.57	0.44	0.57	0.47	0.78	0.55	0.53	0.55	0.44	0.25	0.45	0.44	0.78	0.87	0.86	0.52	0.45	0.54
<i>Handroanthus impetiginosus</i>	0.46	0.55	0.76	0.55	0.67	0.57	0.87	0.48	0.56	0.43	0.76	0.68	0.68	0.65	0.66	0.65	0.56	0.66
<i>Cordia trichotoma</i>	0.50	0.48	0.44	0.67	0.52	0.76	0.58	0.67	0.65	0.28	0.43	0.46	0.66	0.38	0.57	0.54	0.43	0.50
<i>Cordia trichotoma</i>	0.65	0.76	0.63	0.49	0.55	0.49	0.47	0.40	0.40	0.32	0.44	0.44	0.65	0.58	0.78	0.47	0.45	0.38
<i>Handroanthus albus</i>	0.87	0.41	0.56	0.86	0.66	0.60	0.77	0.55	0.67	0.42	0.68	0.66	0.56	0.78	0.55	0.48	0.50	0.78
<i>Cordia americana</i>	0.54	0.39	0.65	0.67	0.56	0.77	0.67	0.51	0.65	0.41	0.56	0.76	0.55	0.88	0.65	0.74	0.66	0.86
<i>Cordia trichotoma</i>	0.44	0.44	0.55	0.48	0.51	0.58	0.45	0.48	0.56	0.28	0.44	0.50	0.57	0.46	0.45	0.53	0.44	0.48
<i>Peltophorum dubium</i>	0.67	0.55	0.45	0.72	0.56	0.59	0.76	0.67	0.55	0.44	0.66	0.54	0.52	0.67	0.43	0.86	0.68	0.65
<i>Cordia trichotoma</i>	0.68	0.87	0.52	0.49	0.67	0.65	0.54	0.44	0.57	0.63	0.42	0.52	0.87	0.66	0.36	0.34	0.48	0.46
<i>Cordia trichotoma</i>	0.63	0.78	0.53	0.46	0.54	0.66	0.51	0.46	0.58	0.35	0.34	0.46	0.48	0.57	0.46	0.43	0.38	0.45
<i>Handroanthus impetiginosus</i>	0.41	0.44	0.45	0.55	0.55	0.55	0.55	0.78	0.67	0.45	0.45	0.56	0.52	0.52	0.58	0.56	0.45	0.55
<i>Cedrela fissilis</i>	0.55	0.46	0.43	0.69	0.63	0.78	0.56	0.54	0.48	0.47	0.58	0.66	0.78	0.67	0.55	0.44	0.56	0.57
<i>Cordia americana</i>	0.58	0.64	0.66	0.67	0.54	0.52	0.76	0.68	0.57	0.68	0.83	0.87	0.56	0.65	0.50	0.86	0.59	0.66
<i>Cedrela fissilis</i>	0.66	0.48	0.66	0.54	0.67	0.47	0.56	0.67	0.75	0.54	0.35	0.56	0.55	0.45	0.46	0.68	0.58	0.58
<i>Cordia trichotoma</i>	0.55	0.55	0.48	0.55	0.57	0.87	0.52	0.56	0.78	0.44	0.45	0.45	0.59	0.76	0.88	0.46	0.54	0.45
<i>Cordia trichotoma</i>	0.58	0.76	0.54	0.47	0.44	0.51	0.48	0.55	0.44	0.45	0.52	0.65	0.47	0.50	0.54	0.46	0.49	0.33
<i>Handroanthus albus</i>	0.48	0.58	0.58	0.48	0.45	0.76	0.67	0.67	0.65	0.65	0.58	0.57	0.68	0.75	0.49	0.44	0.67	0.56
<i>Cordia trichotoma</i>	0.52	0.44	0.47	0.49	0.55	0.72	0.78	0.49	0.57	0.45	0.38	0.56	0.55	0.54	0.54	0.48	0.56	0.39

**Table S2.** (continued)

B – Itapúa

	Species	p1	p2	p3	p4	p5	p6	p7	p8	p9	p10
Conventional system	<i>Handroanthus impetiginosus</i>	0.82	0.48	0.65	0.49	0.50	0.67	0.61	0.55	0.51	0.46
	<i>Handroanthus albus</i>	0.58	0.45	0.47	0.44	0.62	0.48	0.62	0.51	0.67	0.69
	<i>Peltophorum dubium</i>	0.50	0.87	0.58	0.66	0.61	0.76	0.55	0.66	0.72	0.77
	<i>Cordia trichotoma</i>	0.55	0.55	0.67	0.69	0.75	0.92	0.50	0.75	0.55	0.52
	<i>Peltophorum dubium</i>	0.52	0.56	0.50	0.49	0.58	0.70	0.48	0.74	0.62	0.58
	<i>Cedrela fissilis</i>	0.67	0.53	0.62	0.44	0.56	0.66	0.59	0.57	0.48	0.50
	<i>Handroanthus impetiginosus</i>	0.61	0.49	0.60	0.65	0.53	0.54	0.61	0.73	0.58	0.68
	<i>Cordia trichotoma</i>	0.60	0.61	0.69	0.74	0.50	0.52	0.86	0.83	0.47	0.88
Traditional system	<i>Handroanthus impetiginosus</i>	0.83	0.50	0.62	0.77	0.50	0.67	0.55	0.51	0.58	0.48
	<i>Handroanthus albus</i>	0.58	0.49	0.47	0.54	0.55	0.63	0.52	0.69	0.57	0.70
	<i>Peltophorum dubium</i>	0.56	0.55	0.55	0.64	0.62	0.66	0.49	0.66	0.73	0.76
	<i>Cordia trichotoma</i>	0.63	0.67	0.67	0.59	0.69	0.81	0.87	0.59	0.52	0.44
	<i>Peltophorum dubium</i>	0.55	0.54	0.67	0.78	0.48	0.61	0.53	0.56	0.69	0.59
	<i>Cedrela fissilis</i>	0.66	0.50	0.56	0.66	0.55	0.57	0.56	0.47	0.50	0.47
	<i>Handroanthus impetiginosus</i>	0.76	0.59	0.66	0.44	0.45	0.52	0.49	0.55	0.55	0.55
	<i>Cordia trichotoma</i>	0.88	0.52	0.74	0.49	0.44	0.69	0.76	0.72	0.52	0.44
Agroecological system	<i>Handroanthus impetiginosus</i>	0.64	0.59	0.54	0.64	0.59	0.42	0.50	0.56	0.53	0.45
	<i>Handroanthus albus</i>	0.67	0.55	0.59	0.55	0.56	0.59	0.65	0.48	0.69	0.50
	<i>Peltophorum dubium</i>	0.55	0.44	0.56	0.48	0.44	0.63	0.55	0.78	0.47	0.55
	<i>Cordia trichotoma</i>	0.74	0.63	0.43	0.68	0.68	0.88	0.73	0.75	0.74	0.78
	<i>Peltophorum dubium</i>	0.72	0.54	0.73	0.52	0.49	0.67	0.55	0.58	0.68	0.65
	<i>Cedrela fissilis</i>	0.44	0.49	0.56	0.52	0.54	0.51	0.44	0.55	0.51	0.59
	<i>Handroanthus impetiginosus</i>	0.43	0.44	0.65	0.87	0.46	0.62	0.45	0.44	0.45	0.50
	<i>Cordia trichotoma</i>	0.67	0.77	0.76	0.80	0.67	0.49	0.78	0.76	0.69	0.82

**Table S3.** Plausible models for the survival, growth and regeneration of planted species in the two agroforestry experiments

Survival															
Caaguazú	(Intercept)	Sp	Ag.Sy <sub>s</sub>	Pl.Type	Time	Sp*Ag.Sys	Sp*Pl.Type	Sp*Time	Pl.Type*Time	Pl.Type*Ag.Sys					
512	3590128	+	+	+	- 20242831	+	+	+	+	+					
1024	3750841	+	+	+	- 22070376	+	+	+	+	+					
384	3656629	+	+	+	- 21028710	+	+	+	NA	+					
	Sp* Pl.Type*Ag.Sys	Time*Ag.Sys	df	logLik	AICc	delta	weight	R <sup>2</sup> m	R <sup>2</sup> c						
512	NA	NA	35	- 4439055	959.811	0	269608,5	0.868704	0.8748712						
1024	NA	+	36	- 4431835	960.483	0.6720045	192668,1	0.867128	0.873376						
384	NA	NA	33	- 4466650	961.1081	1.2971396	140949,4	0.8633484	0.8693383						
Itapúa															
(Intercept)	Sp	Ag.Sy <sub>s</sub>	Time	Sp*Time	Sp*Ag.Sys	Time*Ag.Sys	df	logLik	AICc	delta	weight	R <sup>2</sup> m	R <sup>2</sup> c		
24	0.5699077	+	+	- 1301533	NA	+	NA	17	-2608205	556.5128	0	863392,6	0.2894882	0.29242	
Growth															
Caaguazú	(Intercept)	Sp	Ag.Sy <sub>s</sub>	Pl.Type	Sp*Ag.Sys	Sp*Pl.Type	Pl.Type*Ag.Sys	df	logLik	AICc	delta	weight	R <sup>2</sup> m	R <sup>2</sup> c	
40	6978656	+	+	+	NA	NA	+	12	1505217	298.5042	0	946708,8	0.867128	0.873376	
Regeneration															
Caaguazú	(Intercept)	Sp	Ag.Sy <sub>s</sub>	Pl.Type	Sp*Ag.Sys	Sp*Pl.Type	Ag.Sys*Pl.Type	df	logLik	AICc	delta	weight			
22	-193025850	+	+	NA	+	NA	NA	12	-6625826	159.8007	0	676183,7			
24	-200038011	+	+	+	+	NA	NA	14	-6455608	161.6283	1,827,547	271155,1			

Itapúa	(Intercept)	Sp	Ag.Sy s	df	logLik	AICc	delta	weight
4	-18.56	+	+	7	-57.896	130.8007	0	676183,7

Abbreviations: AICc, Akaike Information Criterion corrected for  $\Delta AICc \leq 2$ ;  $R^2c$ : conditional  $R^2$  indicating the variability explained by the fixed and random effects;  $R^2m$ , marginal  $R^2$  that considers only the variability explained by the fixed effects; +: fixed and random effects terms that influence the response variable in each set of models; Sp: Specie, Ag.Sys: Agronomic System, Pl.Type: Plantation type.

**Table S4.** Descriptive statistics of the survival, growth, and natural regeneration of planted species at the two study locations, stratified by agronomic system and plantation type.

Variable	Total	Agronomic system			Plantation type		
		Conventional	Agroecological	Traditional	Pathsides	Field edges	Islets
a) Survival (%)							
Caaguazú							
<i>C. fissilis</i>	33.3 ±34.3 <sup>a</sup>	22.2 ± 26.3	50.0 ± 35.3	N/A	58.3 ± 20.4	41.7 ± 37.6	8.33 ± 20.4
<i>C. trichotoma</i>	64.2 ±23.7 <sup>b</sup>	63.0 ± 24.8	65.4 ± 23.9	N/A	77.8 ± 17.2	46.3 ± 23.7	68.5 ± 20.4
<i>H. albus</i>	77.8 ±30.8 <sup>b</sup>	72.2 ± 36.3	83.3 ± 25.0	N/A	58.3 ± 20.4	75.0 ± 41.8	100 ± 0.00
<i>H. impetiginosus</i>	80.6 ±30.4 <sup>b</sup>	77.8 ± 36.3	83.3 ± 25.0	N/A	75.0 ± 27.4	75.0 ± 41.8	91.7 ± 20.4
<i>P. dubium</i>	72.22 ±46.1 <sup>b</sup>	66.7 ± 33.3	77.8 ± 19.2	N/A	66.7 ± 0.00	66.7 ± 47.1	83.3 ± 23.6
<i>C. americana</i>	91.7 ±19.2 <sup>b</sup>	83.3 ± 25.0	100 ± 0.00	N/A	91.7 ± 20.4	83.3 ± 25.8	100 ± 0.00
Itapúa							
<i>C. fissilis</i>	33.3 ±47.9 <sup>a</sup>	40.0 ± 51.6	20.0 ± 42.2	40.00 ± 51.64	N/A	N/A	N/A
<i>C. trichotoma</i>	75.0 ±36.5 <sup>b</sup>	80.0 ± 35.0	90.0 ± 21.1	56.00 ± 43.76	N/A	N/A	N/A
<i>H. albus</i>	73.33 ±44.98 <sup>b</sup>	70.0 ± 48.3	70.0 ± 48.3	80.00 ± 42.16	N/A	N/A	N/A
<i>H. impetiginosus</i>	58.3 ±39.6 <sup>b</sup>	90.0 ± 21.1	45.0 ± 36.9	40.00 ± 39.44	N/A	N/A	N/A
<i>P. dubium</i>	65.3 ±36.9 <sup>b</sup>	60.0 ± 39.4	65.0 ± 33.7	80.00 ± 34.96	N/A	N/A	N/A
b) Relative growth rate in height (m/day <sup>-1</sup> )							
Caaguazú							
<i>C. fissilis</i>	0,00142 ±0,00042 <sup>b</sup>	0,00144 ± 0,00066	0,00137 ± 0,00038	N/A	0,00147 ± 0,00046	0,00131 ± 0,00053	0,00123 ± 0,00012

<i>C. trichotoma</i>	0.00185 ± 0.00017 <sup>b</sup>	0.00198 ± 0.00029	0.00176 ± 0.00033	N/A	0.00193 ± 0.00035	0.00184 ± 0.00031	0.00182 ± 0.00031
<i>H. albus</i>	0.00142 ± 0.00024 <sup>a</sup>	0.00148 ± 0.00030	0.00137 ± 0.00023	N/A	0.00143 ± 0.00024	0.00149 ± 0.00028	0.00137 ± 0.00028
<i>H. impetiginosus</i>	0.00148 ± 0.00027 <sup>b</sup>	0.00153 ± 0.00020	0.00146 ± 0.00037	N/A	0.00153 ± 0.00022	0.00161 ± 0.00031	0.00137 ± 0.00032
<i>P. dubium</i>	0.00138 ± 0.00023 <sup>b</sup>	0.00141 ± 0.00027	0.00135 ± 0.00018	N/A	0.00134 ± 0.00027	0.00139 ± 0.00019	0.00139 ± 0.00029
<i>C. americana</i>	0.00117 ± 0.00025 <sup>a</sup>	0.00129 ± 0.00019	0.00103 ± 0.00031	N/A	0.00116 ± 0.00030	0.00132 ± 0.00018	0.00101 ± 0.00030
Itapúa							
<i>C. fissilis</i>	0.00198 ± 0.00038 <sup>b</sup>	0.00204 ± 0.00061	0.00202 ± 0.00027	0.00191 ± 0.00014	N/A	N/A	N/A
<i>C. trichotoma</i>	0.00232 ± 0.00014 <sup>a</sup>	0.00228 ± 0.00028	0.00231 ± 0.00010	0.00237 ± 0.00012	N/A	N/A	N/A
<i>H. albus</i>	0.00214 ± 0.00018 <sup>b</sup>	0.00198 ± 0.00016	0.00216 ± 0.00018	0.00217 ± 0.00016	N/A	N/A	N/A
<i>H. impetiginosus</i>	0.00205 ± 0.00023 <sup>b</sup>	0.00207 ± 0.00026	0.00213 ± 0.00029	0.00200 ± 0.00015	N/A	N/A	N/A
<i>P. dubium</i>	0.00214 ± 0.00022 <sup>b</sup>	0.00218 ± 0.00020	0.00210 ± 0.00028	0.00218 ± 0.00024	N/A	N/A	N/A
c) Natural regeneration (individuals plot <sup>-1</sup> )							
Caaguazú							
<i>C. trichotoma</i>	0.33 ± 0.48 <sup>b</sup>	0.22 ± 0.44	0.44 ± 0.53	N/A	0.17 ± 0.41	0.33 ± 0.52	0.50 ± 0.55
<i>H. albus</i>	1.83 ± 3.17 <sup>a</sup>	3.00 ± 3.43	0.11 ± 0.33	N/A	3.17 ± 3.87	1.17 ± 2.40	0.33 ± 0.82
<i>P. dubium</i>	1.06 ± 0.80 <sup>b</sup>	0.89 ± 0.93	1.22 ± 0.67	N/A	0.67 ± 0.52	1.17 ± 0.98	1.33 ± 0.82
Itapúa							
<i>C. trichotoma</i>	0.23 ± 0.57 <sup>a</sup>	0.20 ± 0.42	0.50 ± 0.85	0.08 ± 0.44	N/A	N/A	N/A
<i>H. albus</i>	0.27 ± 0.52 <sup>a</sup>	0.20 ± 0.42	0.50 ± 0.71	0.10 ± 0.32	N/A	N/A	N/A
<i>P. dubium</i>	0.27 ± 0.58 <sup>a</sup>	0.10 ± 0.32	0.50 ± 0.85	0.20 ± 0.42	N/A	N/A	N/A

N/A, not applicable.

Different superscripts indicate statistical differences at  $p < 0.05$

**Table S5.** Initial physical and chemical properties of the soil in the experimental plots in Caaguazú (Year= 2010).

Ag.Sys	Pl.Type	pH	Organic material (%)	Al <sup>+3</sup> +H <sup>+</sup> (Cmol.kg <sup>-1</sup> )	Compaction (kpa <sup>-1</sup> )	Depth (cm)	Soil texture
Conventional	Pathside	4,53 ± 0,07 <sup>a</sup>	1,65 ± 0,20 <sup>M</sup>	2,19 ± 0,25 <sup>H</sup>	0,97 ± 0,06 <sup>VC</sup>	10,35 ± 0,86	clay-sandy frank
	Islet	4,8 ± 0,21 <sup>a</sup>	2,27 ± 0,11 <sup>M</sup>	1,33 ± 0,39 <sup>H</sup>	0,89 ± 0,04 <sup>VC</sup>	11,18 ± 1,24	clay-sandy frank
	Field edge	4,83 ± 0,30 <sup>a</sup>	2,36 ± 0,29 <sup>M</sup>	1,33 ± 0,53 <sup>H</sup>	0,47 ± 0,04 <sup>F</sup>	12,57 ± 0,78	clay-sandy frank
	Ref.Ecos	6,50 <sup>n</sup>	2,91 <sup>H</sup>	1,25 <sup>H</sup>	0,18 <sup>S</sup>	22,34	clay-sandy frank

Agroecological	Pathside	5,27 ±0,37 <sup>a</sup>	0,81 ±0,05 <sup>L</sup>	0,47 ±0,54 <sup>M</sup>	0,31 ±0,04 <sup>F</sup>	16,58 ±1,22	Sandy-clay frank
	Islet	5,43 ±0,14 <sup>a</sup>	0,81 ±0,07 <sup>L</sup>	0,24 ±0,30 <sup>L</sup>	0,29 ±0,04 <sup>F</sup>	17,33 ±1,08	Sandy-clay frank
	Field edge	6,32 ±0,72 <sup>sa</sup>	1,29 ±0,78 <sup>M</sup>	0,00 <sup>L</sup>	0,26 ±0,02 <sup>F</sup>	19,12 ±1,23	Sandy-clay frank
	Ref.Ecos	6,52 <sup>n</sup>	2,88 <sup>H</sup>	0,00 <sup>L</sup>	0,16 <sup>S</sup>	24,20	Sandy-clay frank

**Legend:** Ag.Syst = Agronomic system, Pl.Type = Plantation type, Ref.Ecos= Reference ecosystem, a = acid, la = slightly acidic, n = neutral, A = High, M = Medium, L = Low, VC = Very compact, F = Firm, S = Soft. (Source: Soil Laboratory, Faculty of Agricultural Sciences, National University of Asunción, 2010)





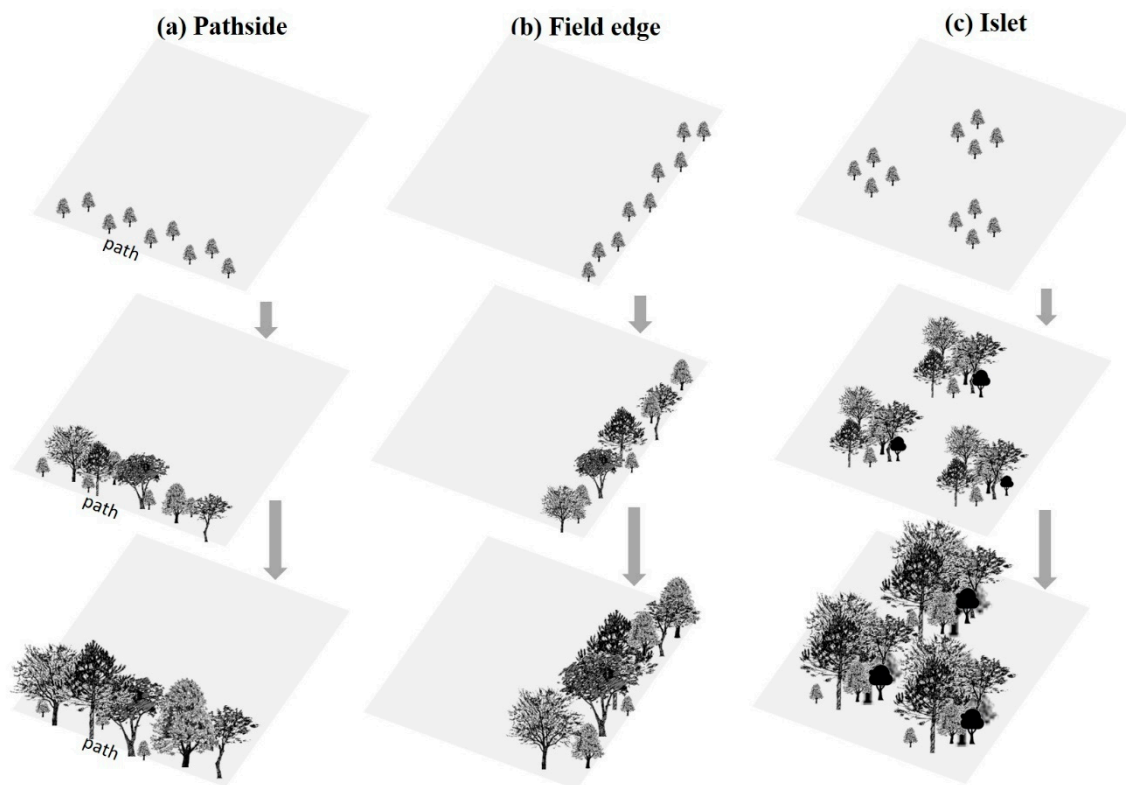


Figure S1. Plot design.

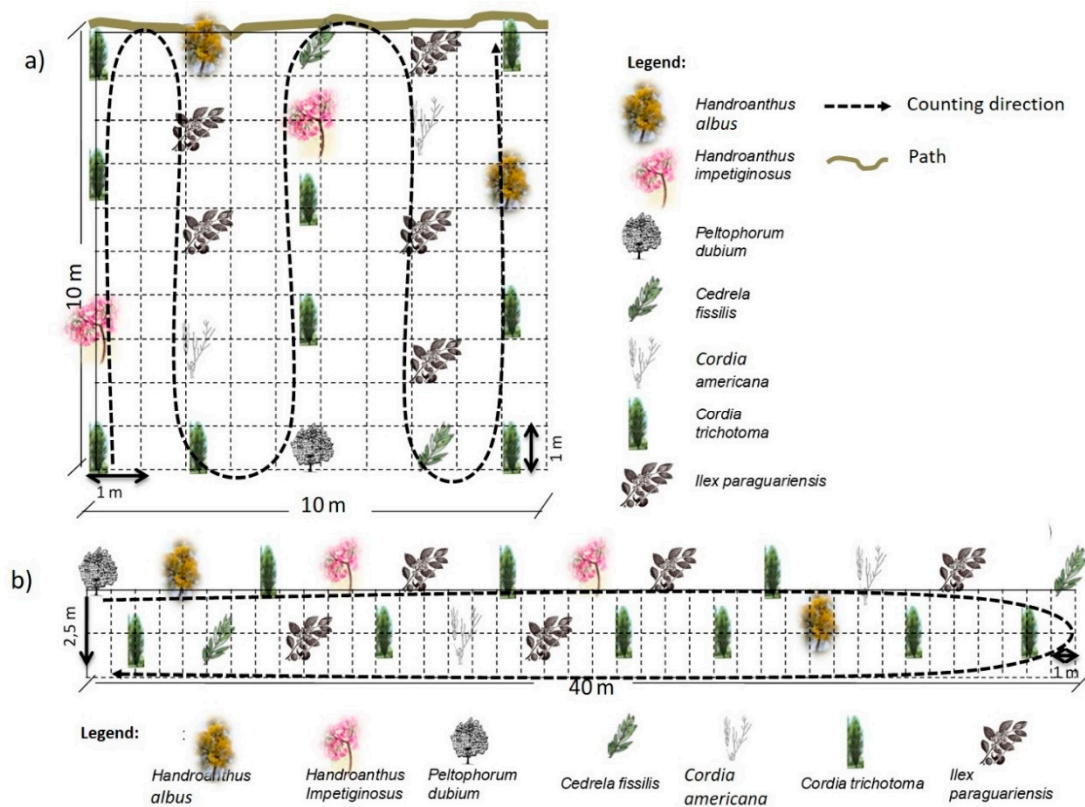


Figure S2. Experiment design in Caaguazú. Arrangement in a) pathside and islet plots and b) field edge plots.

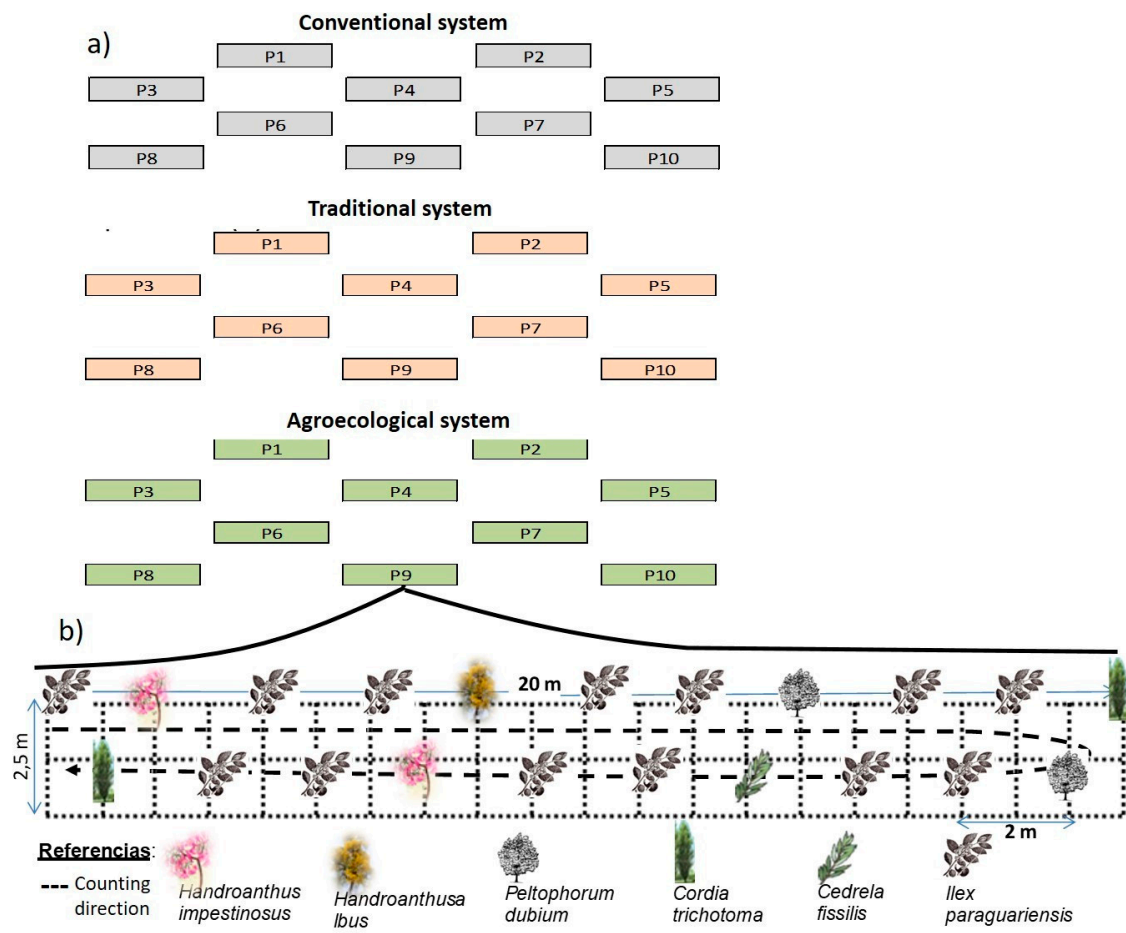


Figure S3. Experiment design in Itapúa. Arrangement in a) plots in the types of plantation and b) plants on the plot.