

A multi-scale approach to study palm-weevils in a tropical agroecosystem; Landscape Ecology; Aymer Andrés Vásquez-Ordóñez, Wilmar Torres-López, and A. Carolina Monmany-Garzia; Universidad del Valle, Departamento de Biología. C.P. 25360 Cali, Valle del Cauca, Colombia. Present address: Instituto de Ecología, Universidad Nacional Autónoma de México, Circuito exterior s/n anexo al Jardín Botánico, Ciudad Universitaria, C.P.04500, Ciudad de México, Mexico. Correspondence: vasquezaymer@ieecologia.unam.mx.

Table S1: Geographical coordinates, sampling dates of peach palm crops in Colombia, number of palms infested by *Dynamis borassi* and *Rhynchophorus palmarum* (NIP), healthy palms (NHP), and proportion of infested palms (IPP) at each site (ID) (NA= does not apply).

Sampling Type	ID	Natural Region	Department	Municipality	Latitude	Longitude	Sampling date	NIP	NHP	IPP
Presampling	NA	Pacific	Nariño	San Andrés de Tumaco	1.5569	-78.6972	Nov 30, 2017	NA	NA	NA
					1.5360	-78.7023	Feb 14, 2019			
			Risaralda	Santa Cecilia	5.3408	-76.1493	Feb 15, 2019			
Sampling	1	Valle del Cauca	Buenaventura		3.7629	-76.9632	Jul 01, 2018	24	38	0.39*
	2				3.9826	-76.9804	Mar 31, 2018	45	92	0.33**
	3				3.7015	-76.9629	Jun 28, 2018	11	35	0.24*
	4				4.0078	-76.9916	Jun 7, 2018	40	130	0.24**
	5				3.6905	-76.9474	Jul 5, 2018	11	41	0.21*
	6				3.6878	-76.9591	Jun 28, 2018	25	63	0.28*
	7				3.9894	-76.9780	Jun 4, 2018	22	115	0.16**
	8				3.9536	-76.9764	Jun 01, 2018	20	145	0.12**
	9	Andes	Cauca	El Tambo	2.3518	-76.8937	Dec 01, 2018	36	3	0.92
	10				2.4097	-76.8230	Nov 30, 2018	13	46	0.22
	11				2.4008	-76.8487	Nov 29, 2018	12	88	0.12
	12				2.4027	-76.8410	Nov 28, 2018	8	219	0.04
	13				2.4239	-76.8418	Nov 30, 2018	3	126	0.02
	14			Santa Rosa	1.4243	-76.4814	Feb 02, 2019	0	89	0.00
	15	Amazonas	Caquetá	Florencia	1,5015	-75,6637	Feb 05, 2019	6	0	1.00
	16				1,3471	-75,4752	Feb 05, 2019	12	5	0.71
	17				1,5514	-75,8517	Feb 06, 2019	11	13	0.46
	18				1,5492	-75,8608	Feb 06, 2019	6	13	0.32
	19		Putumayo	Puerto Guzmán	1,0230	-75,9327	Feb 07, 2019	26	97	0.21
	20		Caquetá	Curillo	1,0324	-75,9985	Feb 07, 2019	9	44	0.17
	21			Florencia	1,4967	-75,6535	Feb 05, 2019	17	118	0.13
	22				1,7257	-75,6558	Feb 08, 2019	4	80	0.05
	23				1,7723	-75,6514	Feb 04, 2019	1	27	0.04

	24			Curillo	1,0381	-76,0004	Feb 07, 2019	2	58	0.04
	25			Florencia	1,7714	-75,6575	Feb 08, 2019	0	79	0.00
	26		Putumayo	Puerto Caicedo	0,6624	-76,4704	Jan 30, 2019	0	335	0.00
	27			San Miguel	0,3502	-76,9676	Feb 01, 2019	0	175	0.00
	28				0,3485	-76,9269	Jan 31, 2019	0	483	0.00
	29			Valle del Guamuez	0,4832	-76,9738	Jan 31, 2019	0	277	0.00
	30			Villagarzon	0,8889	-76,6720	Jan 29, 2019	0	226	0.00
	31				0,8842	-76,5887	Jan 29, 2019	0	192	0.00
	32				0,8881	-76,6009	Feb 01, 2019	0	187	0.00

* Peach palm crops coexisted with *Oenocarpus bataua*, which showed low abundances of unopened inflorescence, according to Bautista-Giraldo et al. (2020).

** Peach palm crops coexisted with *O. bataua*, which showed high abundances of unopened inflorescence, according to Bautista-Giraldo et al. (2020).

References

Bautista-Giraldo A, Armbrrecht I, Vásquez-Ordóñez AA (2020). The weevil *Dynamis borassi* (Coleoptera: Curculionidae: Dryophthorinae) associated with native palms in forests and disturbed areas in Buenaventura, Colombia. Rev Colomb Entomol 46(2): e7721. <https://doi.org/10.25100/socolen.v46i2.7721>

31	0	0	995	0	0	112.5	0	30	0	0	0
32	0	10	0	0	0	0	0	825	40	0	0

Table S3: Climatic characterization of each sampled site (ID) in Colombia, including Annual Mean Diurnal Range (BIO 2), Isothermality (BIO 3), Maximum Temperature of Warmest Month (°C, BIO 5), Minimum Temperature of Coldest Month (°C, BIO 6), Annual Temperature Range (BIO 7), Annual Precipitation (mm, BIO 12), Precipitation of Wettest Month (mm, BIO 13), Precipitation of Driest Month (mm, BIO 14), Precipitation Seasonality (BIO 15), Precipitation of Wettest Quarter (mm, BIO 16), and Precipitation of Driest Quarter (mm, BIO 17). These variables were calculated from the Climate Hazards Group InfraRed Precipitation with Station data (CHIRPS, Funk et al. 2015) and Climate Data Record Based on Infrared Temperatures and Stations by the Climate Hazard (CHIRTS, Funk et al. 2019) from 2010 to 2016. The georeferentiation of each site is documented in Table S1.

ID	Climatic variables										
	BIO 2	BIO 3	BIO 5	BIO 6	BIO 7	BIO 12	BIO 13	BIO 14	BIO 15	BIO 16	BIO 17
1	8.47	70.48	33.19	21.56	11.64	5100.67	769.28	222.48	38.29	1594.10	826.12
a2	8.31	72.13	33.45	22.17	11.28	6162.02	892.66	262.31	36.70	1907.89	1000.70
3	8.57	71.02	33.47	21.85	11.62	4871.97	744.44	213.17	38.41	1519.14	799.25
4	8.68	72.36	33.25	21.53	11.72	6114.44	872.58	247.44	37.01	1902.58	968.86
5	7.84	68.13	33.08	21.88	11.21	3730.19	563.96	152.95	40.05	1172.64	619.43
6	8.50	69.05	33.11	21.27	11.84	4514.36	680.70	189.52	39.06	1414.87	751.30
7	8.81	72.31	33.45	21.57	11.87	6162.02	892.66	262.31	36.70	1907.89	1000.70
8	8.53	72.14	33.45	21.88	11.56	6162.02	892.66	262.31	36.70	1907.89	1000.70
9	6.29	67.61	26.82	17.51	9.31	2423.52	403.45	38.53	61.92	912.24	174.52
10	3.82	48.71	23.90	17.28	6.62	2343.58	390.98	38.97	62.07	892.81	175.23
11	4.82	57.75	23.90	15.93	7.97	2343.58	390.98	38.97	62.07	892.81	175.23
12	6.91	71.77	23.90	14.25	9.64	2343.58	390.98	38.97	62.07	892.81	175.23
13	3.82	48.71	23.90	17.28	6.62	2343.58	390.98	38.97	62.07	892.81	175.23
14	9.31	77.77	26.01	14.02	11.99	3001.45	418.11	117.65	35.65	900.58	538.35
15	9.38	74.97	29.68	17.17	12.51	3501.92	499.48	92.21	42.62	1168.04	572.49
16	11.27	78.33	29.72	15.49	14.24	3251.19	467.71	92.89	42.94	1087.34	520.46
17	7.06	67.67	26.30	15.90	10.40	2943.68	385.60	93.98	36.47	914.56	534.08
18	10.01	75.83	28.38	15.19	13.19	3042.42	406.67	94.07	37.59	963.73	542.17
19	5.12	54.76	30.47	21.04	9.43	3565.18	468.45	130.67	35.19	1099.57	626.27
20	11.49	80.19	30.42	16.35	14.07	3622.16	479.27	136.61	34.47	1107.54	649.63
21	9.62	78.03	29.83	17.52	12.32	3471.01	489.46	93.39	42.23	1156.60	569.46
22	9.56	74.19	29.09	16.19	12.90	2739.26	387.60	70.66	39.33	874.98	460.91
23	7.17	68.52	27.39	16.88	10.51	2577.68	370.98	64.58	39.69	819.93	434.28
24	11.50	80.41	30.41	16.35	14.06	3778.11	513.43	139.02	35.69	1175.90	674.75
25	8.61	72.20	27.39	15.41	11.98	2577.68	370.98	64.58	39.69	819.93	434.28
26	5.63	59.02	30.21	21.08	9.13	4026.90	582.71	148.63	38.52	1243.57	715.86
27	5.25	58.77	29.98	21.40	8.58	3738.92	534.14	147.29	35.49	1103.84	659.00
28	5.29	57.12	29.99	21.16	8.83	3796.18	519.45	152.05	33.86	1101.09	685.99

29	5.16	58.68	29.63	21.21	8.42	3717.74	521.51	151.82	34.39	1083.97	662.64
30	5.22	57.88	30.51	21.63	8.88	3986.97	571.56	148.86	38.70	1255.42	688.84
31	5.15	57.36	30.37	22.00	8.38	4150.76	592.06	155.61	38.65	1287.04	735.49
32	5.21	57.72	30.49	21.88	8.61	4122.87	592.15	153.24	38.68	1291.53	718.12

References

Funk C, Peterson P, Landsfeld M, Pedreros D, Verdin J, Shukla S, Husak G, Rowland J, Harrison L, Hoell A, Michaelsen J (2015) The climate hazards infrared precipitation with stations—a new environmental record for monitoring extremes. *Sci Data* 2:1-21. <https://doi.org/10.1038/sdata.2015.66>

Funk C, Peterson P, Peterson S, Shukla S, Davenport F, Michaelsen J, Knapp KR, Landsfeld M, Husak G, Harrison L, Rowland J, Budde M, Meiburg A, Dinku T, Pedreros D, Mata N (2019) A high-resolution 1983–2016 T max climate data record based on infrared temperatures and stations by the Climate Hazard Center. *J Clim* 32: 5639-5658. <https://doi.org/10.1175/JCLI-D-18-0698.1>

Table S4: Eighteen local variables characterized the 32 peach palm (PP) crops at each sampled site (ID) in Colombia. The georeferences of each site (ID) are documented in Table S1. In parenthesis, the units of each variable and the abbreviations used in Figure S2 are indicated.

ID	Diversity Index of the other crops		PP Crops									
			Characteristics		Management							
	Richness (C1)	Shannon (C2)	Area (ha, C3)	Age (years)	Age weevil's infestation (years)	Fertilizer	Harvest strategy	Insecticide	Lime	Palm spacing (m)	Weeds	Weevil's trapping
1	1	0	1.15	7	4	Present	Both	Present	Added	6	Present	Present
2	0	0	1.44	18	9.5	Present	Tree climbing	Present	Added	11	Present	Present
3	0	0	12.65	6	3	Present	Sickle	Absent	Not added	7	Absent	Present
4	3	0.48	1.55	5	3	Present	Sickle	Absent	Not added	6	Present	Present
5	1	0	0.33	16	-	Absent	Both	Absent	Not added	-	Absent	Present
6	1	0	1.45	20	1	Absent	Sickle	Absent	Not added	6	Present	Present
7	0	0	1.18	16	-	Absent	Tree climbing	Present	Not added	4.5	Absent	Present
8	3	0.98	1.03	8	-	Present	Both	Present	Not added	4.5	Present	Present
9	4	1.26	2.47	-	-	-	-	-	-	-	-	Present
10	7	1.49	1.63	-	1	Present	Both	Present	Added	4	Present	Present
11	2	0.44	0.78	5	1	Present	Tree climbing	Present	Added	-	Present	Present
12	8	1.54	0.44	-	1	Present	Tree climbing	Present	Added	10	Present	Present
13	1	0	0.35	12	1.5	Present	Tree climbing	Present	Added	3	Absent	Present
14	0	0	0.98	5	-	Present	-	Present	Not added	-	Absent	Absent
15	1	0	0.35	10	5	Absent	Both	Absent	Not added	-	Absent	Absent
16	1	0	0.16	10	4.5	Absent	Tree climbing	Absent	Not added	-	-	Absent
17	3	0.77	0.56	10	8	Absent	Tree climbing	Absent	Not added	-	Absent	Absent
18	1	0	0.81	20	-	Present	Tree climbing	Present	Not added	-	Present	Absent
19	0	0	0.11	13.5	-	Absent	Tree climbing	Absent	Added	5	Absent	Absent
20	0	0	0.14	18	-	Absent	Sickle	Absent	-	-	Absent	Absent
21	0	0	0.97	-	-	-	-	-	-	-	-	Absent
22	0	0	0.34	15	4.5	Absent	Both	Absent	Not added	-	Absent	Absent
23	0	79	0	4	-	Present	Tree climbing	Present	-	4	Absent	Absent
24	0	0	0.81	8	-	Absent	Tree climbing	Absent	Not added	10	Absent	Absent
25	0	0	2.56	8	-	Absent	Tree climbing	Present	Added	7	Present	Absent
26	1	0	3.12	10	4.5	Present	Tree climbing	Present	Added	-	Absent	Absent
27	3	0.22	8.06	-	-	-	-	-	-	7	-	-
28	1	0	1.77	6	-	Absent	Tree climbing	Present	-	-	-	Absent
29	2	0.36	0.91	8	-	Present	Tree climbing	Present	Not added	-	Present	Absent

30	1	0	2.16	7.5	-	Present	Both	Present	Added	6	Present	Present
31	3	0.44	3.44	6.5	-	Present	Tree climbing	Present	Added	7	Present	Present
32	3	0.25	0.98	4.5	-	Present	Both	Present	Not added	10	Present	Absent

Continuation of the Table S4

ID	PP crop slope (topography)					
	Average (°, C4)	Deviation (C5)	Minimum (°C, C6)	Maximum (°C, C7)	Range(C8)	Sum (C9)
1	3.28	1.66	0.93	6.72	5.80	374.06
2	5.09	2.47	0	9.89	9.89	748.31
3	4.41	2.06	0	9.48	9.48	5662.03
4	3.90	1.68	0.93	7.83	6.90	607.743
5	5.46	2.17	1.86	9.21	7.35	185.50
6	3.12	1.34	0.93	5.64	4.71	464.31
7	2.50	1.19	0.93	8.70	7.77	297.97
8	2.77	1.05	0.93	4.98	4.05	285.69
9	12.97	6.46	0	24.13	24.13	3203.60
10	13.50	3.65	7.44	21.39	13.95	2227.90
11	11.64	4.30	3.71	18.95	15.24	919.61
12	15.88	3.961	6.20	22.04	15.85	682.87
13	11.75	5.62	4.72	25.20	20.49	434.91
14	17.72	3.64	8.24	22.10	13.86	1736.76
15	7.14	1.27	4.98	11.03	6.05	257.05
16	18.02	4.96	11.03	30.71	19.68	306.34
17	3.92	2.46	1.31	8.34	7.03	219.60
18	3.85	2.02	0.93	9.37	8.45	320.00
19	14.65	0.79	13.4	15.39	1.95	146.49
20	1.98	0.87	0	2.78	2.78	27.71
21	9.42	2.69	3.34	15.79	12.45	941.52
22	19.09	5.11	13.44	32.73	19.29	649.08
23	41.16	13.84	0	0.50	27.32	34.85
24	4.86	2.65	2.07	10.26	8.19	369.49
25	5.36	3.03	0	11.92	11.92	1405.43
26	2.57	1.29	0	4.98	4.98	801.35
27	2.38	1.26	0	7.03	7.03	1928.73
28	4.30	1.30	0.93	6.72	5.79	761.52
29	3.15	1.65	1.31	8.49	7.18	289.75
30	2.70	1.44	0.93	5.92	4.99	587.72
31	3.23	1.46	0.93	7.44	6.51	1109.29
32	2.70	1.19	0.93	5.55	4.62	267.04

Table S5: List of questions included in the semi-structured questionnaire about local variables presented to the farmers at the 32 peach palm crops in our study in Colombia.

Number	Question	Remarks
1	What is the age of the crop?	-
2	What is the plant spacing design?	-
3	Do you practice weed management?	If YES, continue with question 4.
4	What is the frequency of weed management?	-
5	Do you fertilize the crop?	If YES, continue with question 6.
6	How much fertilizer do you apply?	-
7	How long has the problem with stem borer weevil been around?	-
8	What is the percentage of weevil damage in your crop?	-
9	Do you apply insecticide?	If YES, continue with question 10.
10	Which insecticide do you apply and in what quantities?	-
11	What harvesting method do you use to collect the peach palm fruits?	If more than one method is described, continue with question 12.
12	Indicate the proportion of use of each of the harvesting methods?	-
13	Indicate the variety or geographical place from where the peach palm you grow comes from.	-
14	Do you add lime to the crop?	If YES, continue with question 15.
15	Indicate the amount of lime that you add to each plant.	-
16	Do you practice weevils' trapping?	If YES, continue with question 17.
17	Indicate the type of bait used and the number of traps installed in your crop.	-
18	What is the area (hectares) of your peach palm crop?	-
19	What do you think is the cause of weevils' presence in your crop?	-

Table S6: Landscape characterization of the 32 peach palm crops (ID) in Colombia. LM: Total land cover mean; LS: Total land cover sum; LC: Land cover; LP: Landscape proportion; EL: Edge length; ED: Edge density; NP: Number of patches; PD: Patch density; GP: Greatest patch area; SP: Smallest patch area; MePA: Mean patch area; MdPA: Median patch area; LPI: Largest patch index; EN: Euclidean Nearest-Neighbor distance; FD: Fractal dimension index; MePS: Mean patch shape ratio; OC: Overall core area; LA: Like adjacencies; PC: Patch cohesion index; LD: Landscape division; EM: Effective Mesh size; SI: Splitting index. These variables were calculated using a supervised classification of Sentinel 2 images (see Fig. S2), with three land cover types: land area without forest (herein called Non-forest), forest-peach palm crop (herein called Forest), and water. The geographic information of each crop is documented in Table S1.

ID	Land cover								Diversity Index		
	Mean	Sum	Minimum	Maximum	Standard deviation	Low quartile	Median	Upper quartile	Shannon	Shannon's equitability	Simpson
1	1.18	9363	1	2	0.38	1	1	1	0.46	0.67	0.29
2	1.14	9079	1	2	0.35	1	1	1	0.41	0.59	0.24
3	1.19	9488	1	2	0.39	1	1	1	0.49	0.70	0.31
4	1.24	9844	1	3	0.48	1	1	1	0.59	0.54	0.34
5	1.38	10968	1	3	0.66	1	1	2	0.77	0.70	0.44
6	1.40	11172	1	3	0.67	1	1	2	0.80	0.73	0.46
7	1.40	11154	1	3	0.74	1	1	1	0.72	0.65	0.40
8	1.24	9884	1	3	0.64	1	1	1	0.43	0.40	0.23
9	1.56	12390	1	2	0.50	1	2	2	0.69	0.99	0.49
10	1.59	12675	1	2	0.49	1	2	2	0.68	0.98	0.48
11	1.59	12664	1	2	0.49	1	2	2	0.68	0.98	0.48
12	1.67	13290	1	2	0.47	1	2	2	0.64	0.92	0.44
13	1.73	13795	1	2	0.44	1	2	2	0.58	0.84	0.39
14	1.25	9944	1	2	0.43	1	1	1	0.56	0.81	0.37
15	1.65	13084	1	3	0.64	1	2	2	0.94	0.85	0.58
16	1.52	12112	1	2	0.50	1	2	2	0.69	1.00	0.50
17	1.67	13290	1	2	0.47	1	2	2	0.64	0.92	0.44
18	1.67	13290	1	2	0.47	1	2	2	0.64	0.92	0.44
19	1.34	10697	1	3	0.56	1	1	2	0.74	0.67	0.44
20	1.57	12441	1	3	0.56	1	2	2	0.81	0.74	0.53
21	1.35	10712	1	2	0.48	1	1	2	0.65	0.93	0.45
22	1.47	11674	1	2	0.50	1	1	2	0.69	1.00	0.50
23	1.30	10371	1	2	0.46	1	1	2	0.61	0.89	0.42
24	2.02	16089	1	3	0.83	1	2	3	1.10	1.00	0.67
25	1.44	11487	1	2	0.50	1	1	2	0.69	0.99	0.49
26	1.67	13290	1	2	0.47	1	2	2	0.64	0.92	0.44
27	1.56	12403	1	2	0.50	1	2	2	0.69	0.99	0.49

28	1.62	12897	1	2	0.49	1	2	2	0.66	0.96	0.47
29	1.82	14488	1	3	0.54	2	2	2	0.80	0.73	0.47
30	1.54	12233	1	3	0.63	1	1	2	0.90	0.82	0.56
31	1.78	14142	1	2	0.42	2	2	2	0.53	0.76	0.35
32	1.70	13543	1	2	0.46	1	2	2	0.61	0.88	0.42

Continuation of Table S6

ID	Non-forest														
	LC	LP	EL	ED	NP	PD	GP	SP	MePA	MdPA	LPI	EN	FD	MePS	OC
1	139400	0.18	12160	0.02	30	0	103400	100	4646.67	350	12.98	415.08	1.06	1.39	44700
2	111600	0.14	12300	0.02	57	0	38500	100	1957.90	200	4.84	400.12	1.06	1.38	27000
3	151900	0.19	11340	0.01	42	0	99100	100	3616.67	200	12.44	361.80	1.04	1.50	63400
4	146900	0.18	12440	0.02	45	0	70200	100	3264.44	200	8.81	440.71	1.05	1.47	53600
5	144600	0.18	13300	0.02	50	0	50200	100	2892.00	200	6.30	434.80	1.06	1.43	45600
6	151800	0.19	14480	0.02	15	0	31800	100	3300.00	500	3.99	321.85	1.07	1.19	41600
7	71600	0.09	6400	0.01	30	0	19200	100	2386.67	400	2.41	421.49	1.05	1.10	22500
8	13500	0.02	1700	0.00	42	0	6800	100	900.00	300	0.85	448.44	1.03	1.27	3000
9	443700	0.56	22000	0.03	37	0	399700	100	11991.89	300	50.26	429.20	1.05	1.32	253300
10	471600	0.59	21700	0.03	13	0	453100	100	36276.92	700	56.93	412.81	1.08	1.08	268000
11	469800	0.59	20600	0.03	33	0	269500	100	14236.36	200	33.83	337.43	1.06	1.36	287000
12	532900	0.67	23720	0.03	31	0	517800	100	17190.32	200	65.04	388.52	1.06	1.57	323700
13	583900	0.73	17480	0.02	6	0	559700	100	97316.67	1300	70.35	286.87	1.11	0.92	415900
14	198100	0.25	13520	0.02	49	0	157800	100	4042.86	300	19.82	434.80	1.05	1.36	97400
15	366800	0.46	23500	0.03	40	0	240100	100	9170.00	600	30.18	438.47	1.08	1.22	174800
16	416100	0.52	19440	0.02	28	0	392700	100	14860.71	200	49.39	378.86	1.06	1.46	251300
17	488700	0.62	19500	0.03	17	0	461800	100	28747.06	400	58.10	444.70	1.09	1.23	304800
18	392900	0.49	21280	0.03	23	0	287100	100	17082.61	200	36.10	433.82	1.06	1.35	198900
19	202600	0.25	14420	0.02	51	0	86500	100	3972.55	400	10.86	400.63	1.07	1.33	97900
20	397300	0.50	19480	0.02	32	0	348600	100	12415.63	250	43.84	411.83	1.07	1.46	221200
21	275000	0.35	11080	0.01	12	0	125000	100	22916.67	3500	15.70	360.15	1.10	0.88	175200
22	371400	0.47	20800	0.03	35	0	335100	100	10611.43	200	42.10	437.71	1.05	1.44	190000
23	241100	0.30	9180	0.01	19	0	228100	100	12689.47	100	28.66	423.21	1.05	1.57	159100
24	252600	0.32	13720	0.02	72	0	110000	100	3508.33	100	13.82	390.60	1.03	1.68	146900
25	353000	0.444	12420	0.02	15	0	338300	100	23533.33	200	42.52	265.81	1.06	1.48	239000
26	342300	0.430	17660	0.02	23	0	101900	100	14882.61	2200	12.81	310.88	1.08	0.90	179500
27	445400	0.560	19760	0.03	24	0	375200	100	18558.33	250	47.20	438.58	1.07	1.24	273300
28	494900	0.623	27520	0.04	28	0	429600	100	17675.00	100	54.05	405.34	1.04	1.66	242100
29	540600	0.680	18540	0.02	14	0	451200	100	38614.29	150	56.73	440.84	1.06	1.35	364000
30	305500	0.384	17760	0.02	42	0	185500	100	7273.81	200	23.32	412.29	1.05	1.43	165100
31	618900	0.778	19300	0.02	11	0	616400	100	56263.64	100	77.51	344.80	1.06	1.59	433200
32	559200	0.703	21180	0.03	28	0	533700	100	19971.43	100	67.12	383.14	1.04	1.61	362700

Continuation of Table S6

ID	No Forest					Forest								
	LA	PC	LD	EM	SI	LC	LP	EL	ED	NP	PD	GP	SP	MePA
1	0.64	9.54	0.98	13977.99	9.54	657500	0.83	15200	0.02	18	0	510000	100	36527.78
2	0.57	9.26	1.00	3464.47	9.26	684700	0.86	15480	0.02	7	0	682600	100	97814.29
3	0.69	9.51	0.98	13300.50	9.51	645000	0.81	14580	0.02	12	0	460500	100	53750.00
4	0.65	9.48	0.99	10374.55	9.48	630000	0.79	15700	0.02	9	0	411200	100	70000.00
5	0.63	9.30	0.99	5153.32	9.30	573900	0.72	17020	0.02	6	0	303700	100	95650.00
6	0.62	9.13	1.00	3445.91	9.13	561300	0.70	16700	0.02	20	0	477200	100	28065.00
7	0.64	8.90	1.00	916.91	8.90	602300	0.76	12040	0.02	6	0	325000	100	100383.33
8	0.52	8.37	1.00	68.25	8.37	694400	0.87	8380	0.01	3	0	396600	100	231466.67
9	0.78	9.73	0.75	201394.35	9.73	351600	0.44	21920	0.03	36	0	111700	100	9766.67
10	0.79	9.75	0.68	258041.74	9.75	324300	0.41	20460	0.03	39	0	117700	100	8315.39
11	0.80	9.68	0.85	118707.13	9.68	326800	0.41	18960	0.02	46	0	287600	100	7104.35
12	0.80	9.76	0.58	336823.73	9.76	263200	0.33	22280	0.03	59	0	144900	100	4461.02
13	0.86	9.76	0.50	394320.38	9.76	211700	0.27	15380	0.02	25	0	82000	100	8468.00
14	0.71	9.61	0.96	31478.70	9.61	598200	0.75	16440	0.02	5	0	411500	100	119640.00
15	0.72	9.64	0.91	366800.00	9.64	355800	0.45	21600	0.03	39	0	151600	100	9123.08
16	0.79	9.74	0.76	194057.59	9.74	379000	0.48	19820	0.03	29	0	261200	100	13068.97
17	0.82	9.75	0.66	268623.62	9.75	191500	0.24	16820	0.02	42	0	48400	100	4559.52
18	0.76	9.68	0.86	110568.62	9.68	272100	0.34	18320	0.02	68	0	166000	100	4001.47
19	0.70	9.47	0.98	13799.25	9.47	558900	0.70	17380	0.02	12	0	506800	100	46575.00
20	0.78	9.72	0.81	154294.81	9.72	372100	0.47	19280	0.02	63	0	292700	100	5906.35
21	0.82	9.54	0.97	27667.75	9.54	521200	0.66	11220	0.01	16	0	517200	100	32575.00
22	0.75	9.72	0.82	141429.40	9.72	424600	0.53	21800	0.03	37	0	271200	100	11475.68
23	0.83	9.69	0.92	65480.99	9.69	554900	0.70	10100	0.01	13	0	456900	100	42684.62
24	0.76	9.54	0.97	23914.42	9.54	262800	0.33	14640	0.02	29	0	154500	100	9062.07
25	0.84	9.73	0.82	143912.63	9.73	442700	0.56	12380	0.02	20	0	242500	100	22135.00
26	0.77	9.51	0.96	29733.34	9.51	254100	0.32	15480	0.02	37	0	196400	100	6867.57
27	0.80	9.72	0.77	180009.16	9.72	349500	0.44	19620	0.03	31	0	301200	100	11274.19
28	0.76	9.74	0.70	236418.91	9.74	299900	0.38	24920	0.03	83	0	105300	100	3613.25
29	0.84	9.74	0.67	264122.13	9.74	198400	0.25	15580	0.02	63	0	62600	100	3149.21
30	0.75	9.60	0.94	48006.12	9.60	428700	0.54	17500	0.02	24	0	345300	100	17862.50
31	0.86	9.78	0.40	477744.44	9.78	176400	0.22	17760	0.02	69	0	42300	100	2556.52
32	0.83	9.76	0.55	358563.95	9.76	235900	0.30	19960	0.03	67	0	103500	100	3520.90

Continuation of Table S6

ID	Forest											Water		
	MdPA	LPI	EN	FD	MePS	OC	LA	PC	LD	EM	SI	LC	LP	EL
1	100	64.00	307.29	1.03	3.36	523000	0.89	9.75	0.56	352883.03	2.26	-	-	-
2	200	85.72	118.60	1.06	2.85	531400	0.89	9.78	0.27	585137.02	1.36	-	-	-
3	100	57.79	258.91	1.05	2.81	499400	0.89	9.73	0.63	295699.91	2.70	-	-	-
4	2100	51.59	177.20	1.09	1.58	481700	0.88	9.73	0.67	262370.39	3.04	20200	0.03	1760
5	9400	38.13	158.70	1.13	1.71	407100	0.86	9.71	0.76	195332.61	4.08	77900	0.10	4400
6	650	59.86	311.17	1.08	2.22	405200	0.86	9.74	0.64	288401.64	2.76	84100	0.11	5400
7	9900	40.77	300.05	1.09	1.43	478800	0.91	9.71	0.73	215733.30	3.70	123300	0.16	7840
8	297700	49.77	163.21	1.06	1.41	608700	0.94	9.73	0.61	308591.87	2.58	89000	0.11	4500
9	400	14.05	367.70	1.07	2.48	161300	0.73	9.54	0.96	35453.54	22.43	-	-	-
10	300	14.79	400.89	1.08	2.79	157900	0.73	9.57	0.95	37617.03	21.16	-	-	-
11	200	36.10	468.52	1.05	2.83	164500	0.75	9.70	0.87	104011.22	7.66	-	-	-
12	300	18.20	434.19	1.07	2.75	88000	0.65	9.55	0.96	29621.98	26.88	-	-	-
13	900	10.31	416.33	1.09	2.03	83900	0.69	9.47	0.98	15120.83	52.62	-	-	-
14	200	51.68	143.53	1.09	2.31	435600	0.87	9.73	0.68	256235.09	3.11	-	-	-
15	500	19.06	333.50	1.09	2.52	174700	0.74	9.58	0.94	45448.97	17.51	0.092	4200.00	0.005
16	600	32.85	378.42	1.07	2.40	207200	0.77	9.67	0.89	91522.78	8.69	-	-	-
17	350	6.09	310.78	1.08	2.62	63200	0.64	9.32	0.99	7270.14	109.32	114600	0.14	3020
18	250	20.88	424.81	1.05	2.81	137500	0.71	9.59	0.95	37486.41	21.21	130200	0.16	4520
19	100	63.61	359.56	1.04	3.01	391800	0.86	9.75	0.59	325576.54	2.45	35200	0.04	3620
20	300	36.81	395.95	1.08	2.63	228500	0.77	9.69	0.86	108674.81	7.32	25800	0.03	4740
21	200	64.96	482.28	1.04	2.89	423000	0.90	9.76	0.58	335967.72	2.37	61200	0.08	3300
22	300	34.07	376.00	1.08	2.55	245800	0.77	9.66	0.88	98770.88	8.06	-	-	-
23	200	57.40	145.76	1.04	2.74	460900	0.91	9.74	0.66	270070.06	2.95	-	-	-
24	300	19.42	435.86	1.07	2.50	138700	0.76	9.57	0.96	33335.28	23.87	280300	0.35	8080
25	200	30.48	258.61	1.05	2.83	330900	0.87	9.69	0.85	120108.12	6.63	-	-	-
26	200	24.69	433.91	1.05	2.82	124400	0.74	9.64	0.94	50237.85	15.84	199100	0.25	3120
27	200	37.89	370.26	1.07	2.96	187700	0.75	9.70	0.86	115155.38	6.90	-	-	-
28	200	13.25	434.53	1.06	3.03	119100	0.66	9.53	0.97	27853.38	28.54	-	-	-
29	300	7.87	382.01	1.06	2.67	83100	0.67	9.37	0.99	8842.07	89.96	56400	0.07	2580
30	550	43.41	378.47	1.09	2.06	282000	0.82	9.71	0.81	152978.67	5.20	-	-	-
31	400	5.32	403.84	1.07	2.56	53300	0.60	9.22	0.99	5223.99	152.24	-	-	-
32	300	13.02	413.74	1.07	2.75	89500	0.65	9.47	0.98	16860.53	47.16	-	-	-

Continuation of Table S6

[illegible]

Continuation of Table S6

ID	Water		
	LD	EM	SI
1	-	-	-
2	-	-	-
3	-	-	-
4	1.00	234.45	3399.87
5	0.99	6786.93	117.34
6	0.99	7365.04	108.24
7	0.99	9088.32	87.72
8	0.99	6339.49	125.70
9	-	-	-
10	-	-	-
11	-	-	-
12	-	-	-
13	-	-	-
14	-	-	-
15	6698.09	118.78	0.09
16	-	-	-
17	0.98	16151.64	49.21
18	0.98	18592.03	42.77
19	1.00	748.56	1064.31
20	1.00	162.78	4885.22
21	0.99	4678.18	170.02
22	-	-	-
23	-	-	-
24	0.92	64010.44	12.43
25	-	-	-
26	0.94	49831.31	15.96
27	-	-	-
28	-	-	-
29	1.00	3999.20	198.89
30	-	-	-
31	-	-	-
32	-	-	-

Table S7: Soil characterization at 32 peach palms sampled crops (ID) in Colombia. The values are presented at the depths of 0-5 cm, 5-15 cm, and 15-30 cm, from which the weighted and arithmetic mean (WM and AM, respectively) were calculated. These variables were extracted from Soil Grids 250 m database (Hengl et al. 2017). The geographic information of each crop is documented in Table S1. In parenthesis, the units of each variable and the abbreviations used in Figure S2 are indicated.

	Chemical properties															
	Organic Carbon Density (g/dm3, S1)					Soil Organic Carbon Stock (t/ha, S2)	Soil Organic Carbon (dg/kg, S3)					Nitrogen (cg/kg, S4)				
ID	0-5m	5-15m	15-30m	WM	AM		0-5m	5-15m	15-30m	WM	AM	0-5m	5-15m	15-30m	WM	AM
1	539	413	252	322.1	412.67	57	1542	1101	1304	1683.2	1671.00	729	363	294	359.5	443.33
2	590	419	229	324.5	395.33	60	1829	1367	1817	1169.3	1297.33	646	385	299	349.1	459.00
3	550	407	218	277.3	355.67	57	1446	1067	965	1164.2	1265.67	658	329	283	255.2	317.33
4	533	402	251	315	391.33	60	1676	1093	1123	1282.1	1326.00	746	347	284	418.9	490.33
5	575	339	224	293.6	379.33	57	1518	947	1800	1515.9	1421.67	417	281	199	245.4	299.00
6	537	403	234	267.8	344.67	54	1607	1004	1367	1445.1	1388.67	709	364	398	266.5	314.67
7	529	328	210	329	401.33	61	1571	1095	1131	1266.9	1315.67	461	285	206	358.2	462.00
8	518	312	204	307.9	391.67	57	1512	995	1659	1043.7	1159.33	421	298	225	334.3	423.33
9	483	415	339	290.9	333.33	68	592	573	356	322.1	401.00	345	414	261	194.6	234.67
10	480	373	300	336.6	372.67	93	477	415	290	445.8	495.33	358	341	185	368.6	388.00
11	483	309	326	339.9	384.33	85	594	496	396	346.2	394.00	383	461	320	249.1	294.67
12	540	443	340	376.2	412.33	92	806	750	415	444.7	507.00	468	516	308	315.3	340.00
13	428	317	255	390.9	441.00	105	533	444	226	554.6	657.00	308	246	150	386.4	430.67
14	560	480	360	416	305.33	61	841	586	320	451.9	517.67	425	384	251	308.3	225.00
15	426	277	182	229.9	282.33	54	525	243	232	436.1	452.00	350	224	112	199.5	242.00
16	437	291	231	219.7	277.00	52	579	258	201	456.4	520.00	373	238	130	233.6	274.33
17	474	328	228	234.9	295.00	61	738	587	579	264.6	333.33	390	276	207	169.4	228.67
18	459	326	220	269.6	319.67	60	773	637	603	255.9	346.00	368	263	201	186.7	247.00
19	493	401	282	271.3	340.33	70	635	662	320	643.4	685.67	355	270	170	251.7	299.33
20	379	296	172	282.6	343.33	65	542	355	459	597.3	634.67	336	227	163	246	291.00
21	381	313	222	265.2	466.67	117	640	410	503	488.8	582.33	341	202	132	173.9	353.33
22	451	357	259	307.6	355.67	67	557	419	248	330.2	408.00	332	284	198	237.2	271.33
23	507	436	343	338.8	392.00	77	723	604	282	454.1	539.00	434	314	201	218.5	265.00
24	385	288	158	275.7	335.00	68	631	547	382	630.2	671.00	359	269	195	236.3	277.33
25	500	318	238	387.3	428.67	76	612	321	316	422.7	536.33	471	254	167	258.2	316.33
26	484	331	206	288.2	352.00	62	767	691	599	347.1	416.33	396	297	205	223.5	297.33
27	554	333	244	301.7	377.00	55	600	358	348	376.2	435.33	483	266	175	233.1	308.00
28	540	331	265	312.3	378.67	63	761	424	533	523.1	572.67	464	284	180	239.6	309.33
29	579	372	266	329.1	405.67	75	799	402	411	447.1	537.33	451	235	212	242.8	299.33
30	535	353	260	315.4	382.67	70	1338	822	1233	1120.2	1131.00	451	238	161	213.1	283.33

31	492	344	351	363	395.67	59	1439	898	1152	1104.5	1163.00	467	261	160	221	296.00
32	494	356	249	305.6	366.33	66	1428	933	1148	1111.5	1169.67	468	318	214	270.6	333.33

Continuation of the Table S7.

ID	Chemical properties										Physical properties				
	Cation Exchange Capacity at pH7 (mmol/kg, S5)					pH Water (pH*10, S6)					Bulk Density (cg/cm3, S7)				
	0-5m	5-15m	15-30m	WM	AM	0-5m	5-15m	15-30m	WM	AM	0-5m	5-15m	15-30m	WM	AM
1	226	202	182	183.5	194.33	49	50	50	48.9	48.67	110	111	115	112.4	111.33
2	221	186	176	188.6	199.00	48	49	49	50.9	50.67	110	110	114	113.9	112.33
3	186	152	140	171	178.33	49	50	50	48.1	48.33	111	111	115	110.6	109.33
4	221	197	179	164.5	177.00	50	51	51	49.6	49.33	110	111	116	113	111.67
5	204	146	132	143.4	160.67	48	48	49	48.6	48.33	111	110	115	113.1	112.00
6	205	172	154	159.3	171.00	49	49	50	49	49.00	110	110	115	113.1	112.00
7	195	175	165	192.4	203.33	49	48	48	49.9	49.67	107	109	112	113.3	112.00
8	198	165	150	148.2	159.33	49	49	49	49.9	49.67	111	110	115	113.4	112.33
9	220	238	212	220.7	221.67	53	53	53	51	51.00	102	104	106	107.4	106.67
10	202	222	203	237.1	240.33	51	51	51	50	50.00	99	100	100	93.7	93.00
11	241	250	230	208.6	209.00	50	50	50	51	51.00	91	94	94	99.9	996.67
12	235	251	233	220.6	223.33	49	49	50	53	53.00	96	99	98	105	104.00
13	224	221	220	238.6	239.67	51	51	51	49.6	49.33	105	107	108	98.1	976.67
14	272	222	197	212	167.00	29	29	29	49	47.33	94	96	100	98.2	113.00
15	244	164	145	102.9	129.67	46	47	48	46.9	46.67	109	111	118	114.2	112.67
16	227	168	145	128.2	143.33	46	47	47	47.7	47.67	107	109	115	113.7	111.67
17	236	182	164	160.6	184.33	50	51	51	47.5	47.00	108	112	115	115	112.67
18	229	189	170	160.1	180.00	48	48	49	46.9	46.67	102	106	110	112.4	110.33
19	205	170	159	149.1	163.67	51	51	52	51.6	51.33	100	102	106	115.9	113.67
20	198	105	86	176.6	194.00	46	47	47	50.9	50.67	110	112	116	113.4	111.67
21	219	153	129	145.2	230.33	47	47	48	47.6	49.00	110	112	117	114.8	966.67
22	232	189	170	181.9	197.00	50	50	50	50	50.00	105	108	114	111.3	109.00
23	196	165	156	166.9	178.00	52	53	52	51.6	51.33	92	95	99	104.2	102.67
24	181	131	118	181.6	196.00	48	47	48	48.6	48.33	108	111	116	108	106.00
25	244	134	110	162.7	172.33	48	49	50	52.3	52.33	106	109	109	97.1	953.33
26	198	155	138	130.6	162.67	51	51	52	49.5	49.00	109	114	118	108.7	108.00
27	306	205	191	206.7	234.00	49	49	50	49.6	49.33	103	105	108	106.6	105.33

28	245	170	146	163.1	187.00	49	50	50	49.9	49.67	102	104	106	105	104.00
29	263	167	136	158	188.67	49	49	49	49	49.00	105	107	111	109.2	107.67
30	224	140	118	135.2	160.67	50	50	50	50	50.00	105	108	113	110.7	108.67
31	227	127	113	128.6	155.67	49	49	50	49.6	49.33	105	108	109	108.3	107.33
32	227	143	122	138.8	164.00	49	49	50	49.6	49.33	103	106	108	106.9	105.67

Continuation of the Table S7.

ID	Physical properties														
	Clay Content (g/kg, S8)					Coarse Fragments (cm ³ /dm ³ , S9)					Sand (g/kg, S10)				
	0-5m	5-15m	15-30m	WM	AM	0-5m	5-15m	15-30m	WM	AM	0-5m	5-15m	15-30m	WM	AM
1	263	266	281	366.3	358.33	31	35	34	71.3	71.00	418	417	411	333.3	337.00
2	348	349	378	255.4	255.33	71	70	72	37.6	366.67	342	341	328	444	442.67
3	226	225	254	296.7	285.00	46	46	49	40.9	396.67	423	426	416	377.9	387.33
4	256	254	256	222.1	226.00	34	38	38	30.5	296.67	441	441	446	498	493.00
5	271	269	303	289.6	281.00	94	103	107	104.5	101.33	409	406	387	394.9	400.67
6	232	229	217	306.6	304.00	29	28	32	80.8	80.00	486	488	505	396.8	401.00
7	270	271	314	274.7	270.00	37	40	42	34	333.33	401	396	365	413.5	415.33
8	297	307	308	242.5	235.00	79	79	82	47.8	47.00	410	400	393	419.7	421.67
9	290	289	317	304	296.33	46	48	50	43.5	39.00	330	335	321	332.4	336.67
10	289	281	305	289.3	284.67	42	45	49	46.4	43.00	335	343	326	351.7	354.00
11	274	287	293	296.2	291.67	38	40	51	47.1	453.33	358	355	349	332	334.67
12	306	309	323	305.9	298.67	51	56	59	49	48.00	388	388	387	326.1	328.67
13	289	283	317	317.1	312.67	30	39	48	57.3	553.33	339	347	324	387.4	387.67
14	368	373	386	380.3	299.33	95	95	96	95.6	913.33	381	384	371	375.9	450.00
15	226	232	286	321.4	303.67	82	86	90	52.6	52.00	466	473	431	444.6	457.00
16	244	241	302	344.2	330.67	75	78	76	62.6	596.67	473	486	441	370.4	378.33
17	272	274	317	263.8	248.00	46	53	53	88	86.00	413	411	391	447.1	456.67
18	284	281	320	277.9	262.33	39	44	42	76.5	763.33	404	406	382	457.7	466.67
19	339	339	363	330.7	316.67	90	89	88	87.2	89.00	368	372	353	414.5	421.00
20	280	284	347	299.6	287.67	49	55	52	52.3	506.67	474	470	427	399.2	405.00
21	278	279	341	316.1	375.67	94	95	85	88.9	953.33	465	464	421	438.3	378.67
22	349	368	341	349.9	352.67	83	81	90	86.6	846.67	399	395	400	398.4	398.00
23	377	372	398	353.4	347.00	92	88	80	88.5	89.00	353	359	336	360.2	364.33
24	313	315	364	304.7	295.00	56	56	67	42.3	416.67	389	387	359	391.4	397.33
25	380	394	375	388.1	382.33	66	71	74	83.6	866.67	286	290	307	344.6	349.33
26	298	301	351	381.2	383.00	92	90	85	72.3	703.33	428	431	404	299.8	294.33
27	353	358	444	409.1	385.00	68	72	65	67.4	683.33	283	281	243	258.4	269.00
28	372	371	438	411.3	393.67	70	73	66	68.5	696.67	292	297	265	277.3	284.67

29	296	304	380	348.8	326.67	73	83	76	77.8	773.33	331	331	294	308.8	318.67
30	384	391	380	383.7	385.00	65	67	56	60.2	626.67	311	313	320	317	314.67
31	392	393	418	407.9	401.00	31	36	34	34.3	336.67	275	280	269	272.9	274.67
32	378	386	400	393.6	388.00	44	51	50	49.7	483.33	290	291	288	289.1	289.67

Continuation of the Table S7.

ID	Physical properties					Soil Group (%)				
	Silt (g/kg, S11)					Fluvisols (S12)	Histosols (S13)	Ferrasols (S14)	Cambisols (S15)	Gleysols (S16)
	0-5m	5-15m	15-30m	WM	AM					
1	319	317	307	300.4	304.67	28	11	10	10	8
2	310	310	294	300	301.67	22	16	14	14	11
3	351	348	330	325.1	327.33	17	16	15	12	12
4	303	305	297	279.9	281.00	28	12	10	9	8
5	320	326	310	315.8	318.67	31	19	11	9	8
6	282	283	278	296.5	294.67	25	13	12	10	9
7	329	332	321	311.2	314.33	31	16	12	8	8
8	292	293	299	337.5	343.00	29	16	11	9	7
9	380	376	361	364.2	367.33	27	14	12	12	8
10	377	376	368	358.4	361.00	26	18	11	9	8
11	368	358	357	371.3	373.67	23	12	10	9	9
12	306	303	290	367.4	372.33	26	16	14	10	6
13	372	370	360	295.5	299.67	19	18	16	10	7
14	251	243	242	243.2	251.00	20	12	12	10	7
15	308	295	283	234.6	239.67	28	18	11	6	6
16	283	273	257	284.8	290.67	25	15	14	11	4
17	315	315	293	289.1	295.33	29	13	11	9	8
18	312	313	298	264.4	271.00	23	17	9	9	7
19	293	290	285	255.4	263.67	18	15	13	13	11
20	246	246	227	301.8	307.67	23	16	13	7	6
21	257	257	239	246.2	245.33	18	18	12	8	7
22	251	237	259	251.6	249.00	21	18	16	10	6
23	270	269	266	287.3	289.33	25	17	16	8	7
24	298	298	276	303.9	307.67	17	16	13	10	6
25	334	316	318	267.3	268.33	21	21	12	6	5
26	277	269	245	319	322.67	15	13	12	11	11
27	364	361	314	333.1	346.33	19	15	14	10	7
28	336	332	297	311.4	321.67	16	15	14	9	6

29	373	364	326	342.1	354.33	17	16	15	7	6
30	305	296	299	298.7	300.00	29	15	10	7	5
31	333	328	313	319.5	324.67	20	15	12	6	6
32	332	323	312	317.3	322.33	20	17	15	7	6

References

Hengl T, Mendes de Jesus J, Heuvelink GB, Ruiperez Gonzalez M, Kilibarda M, Blagotić A, et al. (2017) SoilGrids250m: Global gridded soil information based on machine learning. PLoS One 12:e0169748. <https://doi.org/10.1371/journal.pone.0169748>.

Table S8: Correlation matrix of local qualitative variables at 32 peach palm crops in our study in Colombia. Spearman correlation values are shown at the upper right of the diagonal and p-values are shown at the lower left of the diagonal. Bold values correspond to p-values <0.05 and Spearman correlations >0.8.

p-value/Spearman correlation		Other crops		Crop age	Cultivation area	Age of weevil's infestation	Crop slope					
		Richness	Shannon diversity				Minimum	Maximum	Range	Average	Deviation	Sum
Other crops	Richness	-	0.87	-0.26	0.22	0.47	-0.06	-0.2	-0.3	-0.16	0.01	0.03
	Shannon diversity	0.05	-	-0.38	0.19	0.4	-0.01	-0.04	0.1	-0.03	0.11	0.15
Crop age		0.19	0.75	-	-0.33	0.27	-0.07	-0.05	-0.07	-0.13	-0.13	-0.49
Cultivation area		0.23	0.29	0.09	-	-0.22	-0.7	-0.38	-0.13	-0.44	-0.16	0.65
Age weevil's infestation		0.09	0.15	0.40	0.45	-	-0.17	0.09	-0.13	-0.11	-0.21	-0.43
Crop slope	Minimum	0.75	0.96	0.72	0.00	0.56	-	0.65	0.36	0.73	0.38	-0.18
	Maximum	0.26	0.83	0.81	0.03	0.77	0.00	-	0.87	0.92	0.81	0.34
	Range	0.6	0.47	0.73	0.47	0.65	0.04	0.00	-	0.72	0.94	0.5
	Average	0.39	0.88	0.51	0.01	0.71	0.00	0.00	0.00	-	0.76	0.27
	Deviation	0.94	0.54	0.53	0.40	0.45	0.03	0.00	0.00	0.00	-	0.47
	Sum	0.89	0.85	0.01	0.42	0.12	0.34	0.06	0.00	0.13	0.01	-

Table S9: Association of local qualitative variables at the 32 peach palm crops in Colombia, according to a Fisher test. Bold values correspond to p-value <0.05.

Crop management variables		p-value
Weeds	Fertilizer	0.05
	Insecticide	0.02
	Lime	0.24
	Harvest strategy	0.87
	Weevil's tramping	0.06
Fertilizer	Insecticide	0.00
	Lime	0.10
	Harvest strategy	1.00
	Weevil's tramping	0.03
Insecticide	Lime	0.03
	Harvest strategy	0.04
	Weevil's tramping	0.45
Lime	Harvest strategy	0.18
	Weevil's tramping	0.23
Harvest strategy	Weevil's tramping	0.38

Table S10: Parameters of the best generalized linear models for variable groups identified by correlation (Table S8) and association (Table S9) analysis to explain infestation levels of the palm weevil *Dynamis borassi-Rhynchophorus palmarum* in peach palm colombian crops. Model 1 includes the “Crop Age” variable with 27 sampling sites and model 2 does not include “Crop Age” and involves 30 sampling sites. Bold values correspond to a p-value <0.05. For each model, the error distribution family was quasibinomial and degree of freedom was 1. “-” does not apply.

Models	Statistic result	Variable							Number of models evaluated
		Weevil's Tramping	Richness index of the other crops	Crop area	Crop age	Minimum slope average	Slope deviation	Slope sum	
1	Chi square value for variable	3.12	0.27	0.41	0.83	0.31	2.45	0.57	959
	P-value	0.07	0.60	0.52	0.36	0.58	0.12	0.45	
2	Chi square value for variable	5.03	1.85	0.00	-	0.17	1.51	0.08	481
	P-value	0.02	0.17	0.96	-	0.68	0.22	0.78	

Table S11: Statistical tests comparing variables among natural regions in Colombia that had a significant effect on peach palm infestation levels. Bold values correspond to a p-value <0.05 and thus indicate an effect of natural region on that variable. “-”: does not apply. The statistical test of significance variables is presented in Table S10 and Fig. 3, 4, and 5.

Type of variable	Significant variable	Statistic	Statistic value	Degree freedom	p-value
Local	Weevil's Tramping	Fisher's exact test	-	-	0.000
Landscape	Simpson's Diversity index	Kruskal-Wallis test	12.05	2	0.002
	Number of non-forest Patches		3.91		0.142
	Total Land cover		13.39		0.001
	Fractal Dimension Index of non-forest		2.64		0.267
	Organic Carbon Density		7.6346		0.022
Soil	Coarse Fragments	ANOVA	4.468		0.107
	Soil Organic Carbon Stock		31.32		0.000
Weather	Isothermality	Kruskal-Wallis test	2.38		0.304

Table S12: Coefficient of determination (R^2) and AIC values of the Partial Least Squares Regression Generalized Linear Models (PLS-GLM) of the proportion of peach palm crops infested by *Dynamis borassi-Rhynchophorus palmarum* with respect to landscape, climatic, and soil variables (See Table S3, S4, and S6). The error distribution family of the response variable is binomial. Bold values correspond to the lowest AIC value. “-”: does not apply.

Component	Landscape		Weather		Soil	
	R^2	AIC	R^2	AIC	R^2	AIC
0			-	27.40	-	27.40
1	0.21	27.47	0.16	27.30	0,35	25,92
2	0.63	23.58	0.19	28.63	0,51	24,21
3	0.66	23.21	0.27	30.48	0,59	24,63
4	0.77	22.03	0.30	31.61	0,67	24,91
5	0.80	23.49	0.37	31.48	0,67	27,12
6	0.86	23.82	0.19	31.51	0,70	28,83
7	0.89	25.91	1.07	32.71	0,71	30,74
8	0.90	27.61	1.02	34.58	0,71	32,93
9	0.91	29.22	0.81	34.46	0,71	34,85
10	0.94	31.13	0.75	36.24	0,71	36,91

Table S13: Confidence Intervals resulting from Partial Least Squares Regression Generalized Linear Models (PLS-GLM) of the proportion of peach palm crops infested by *Dynamis borassi-Rhynchophorus palmarum* with respect to landscape variables (See Table S6). LC: Landcover; LP: Landscape proportion; EL: Edge length; ED: Edge density; NP: Number of patches; PD: Patch density; GP: Greatest patch area; SP: Smallest patch area; MePA: Mean patch area; MdPA: Median patch area; LPI: Largest patch index; EN: Euclidean Nearest-Neighbor distance; FD: Fractal dimension index; MePS: Mean patch shape ratio; OC: Overall core area; LA: Like adjacencies; PC: Patch cohesion index; LD: Landscape division; EM: Effective Meshsize; SI: Splitting index. Bold values and variables do not include the zero in their intervals.

		95% Confidence Intervals	
Type	Variable	Lower	Upper
Land cover	Mean	0.03	0.72
	Sum	0.03	0.71
	Standard deviation	-0.26	0.21
Diversity Index	Shannon	-0.14	0.32
	Shannon's equitability	-0.58	-0.04
	Simpson	-0.24	0.25
No Forest	LC	-0.07	0.13
	LP	-0.07	0.13
	EL	-0.36	0.04
	ED	-0.36	0.04
	NP	0.05	0.58
	PD	0.05	0.58
	GP	-0.14	0.05
	MePA	0.15	0.72
	MdPA	-0.08	0.50
	LPI	-0.14	0.05
	EN	-0.53	0.07
	FD	0.09	0.86
	MePS	-0.52	0.09
	OC	-0.13	0.08
	LA	-0.58	-0.07
	PC	-0.28	0.07
	LD	-0.11	0.11
	EM	-0.11	0.11
	SI	-0.14	0.18
Forest	LC	-0.71	-0.03
	LP	-0.71	-0.03
	EL	-0.35	0.07
	ED	-0.35	0.08
	NP	-0.47	0.22
	PD	-0.47	0.22
	GP	-0.08	0.26
	MePA	-0.15	0.22
	MdPA	-0.15	0.17
	LPI	-0.08	0.26
	EN	-0.19	0.29
	FD	-0.03	0.67
	MePS	-0.34	0.24
	OC	-0.62	0.00
	LA	-0.58	-0.01
	PC	-0.16	0.24
	LD	-0.46	0.06
	EM	-0.06	0.47
	SI	-0.54	0.13
Water	LC	0.07	0.90
	LP	0.07	0.89

	EL	-0.28	0.27
	ED	-0.27	0.27
	NP	0.00	1.24
	PD	0.00	1.25
	GP	-0.00	0.57
	SP	-0.20	0.12
	MePA	-0.08	0.28
	MdPA	-0.20	0.12
	LPI	0.00	0.57
	EN	-0.23	0.24
	FD	-0.77	-0.18
	MePS	-0.21	0.23
	OC	0.05	1.02
	LA	-1.26	-0.30
	PC	-1.20	-0.41
	LD	-0.85	-0.31
	EM	0.10	1.15
	SI	-0.17	1.90

Table S14: Confidence Intervals resulting from Partial Least Squares Regression Generalized Linear Models of the proportion of peach palm crops infested by *Dynamis borassi-Rhynchophorus palmarum* with respect to soil variables (See Table S7). Bold values and variable intervals differ from zero.

Type	Variable	95% Confidence Intervals	
		Lower	Upper
Chemical properties	Organic Carbon Density	-2.92	-0.61
	Soil Organic Carbon Stock	-1.62	0.00
	Soil Organic Carbon	-0.48	0.27
	Nitrogen	-0.77	0.22
	Cation Exchange Capacity	-0.18	1.29
Physical properties	pH Water	-0.86	0.16
	Bulk Density	-1.24	0.23
	Clay Content	-1.07	0.02
	Coarse Fragments	-1.25	-0.11
	Sand	-0.09	0.61
	Silt	-0.30	0.79
Soil group	Fluvisols	-0.42	0.26
	Histosols	-0.31	0.50
	Ferrasols	-0.11	1.05
	Cambisols	-0.03	0.84
	Gleysols	-0.11	0.51

Table S15: Confidence Intervals resulting from Partial Least Squares Regression Generalized Linear Models of the proportion of peach palm crops infested by *Dynamis borassi-Rhynchophorus palmarum* with respect to climatic variables (See Table S3). Annual Mean Diurnal Range (BIO 2), Isothermality (BIO 3), Maximum Temperature of Warmest Month (°C, BIO 5), Minimum Temperature of Coldest Month (°C, BIO 6), Annual Temperature Range (BIO 7), Annual Precipitation (mm, BIO 12), Precipitation of Wettest Month (mm, BIO 13), Precipitation of Driest Month (mm, BIO 14), Precipitation Seasonality (BIO 15), Precipitation of Wettest Quarter (mm, BIO 16), and Precipitation of Driest Quarter (mm, BIO 17). Bold values and variable intervals differ from zero.

Type	Variable	95% Confidence Intervals	
		Lower	Upper
Temperature	BIO 2	0.07	0.53
	BIO 3	0.10	0.57
	BIO 5	0.00	0.14
	BIO 6	-0.24	0.01
	BIO 7	0.09	0.58
Precipitation	BIO 12	-0.09	0.05
	BIO 13	-0.10	0.07
	BIO 14	-0.09	0.04
	BIO 15	-0.14	0.06
	BIO 16	-0.10	0.08
	BIO 17	-0.04	0.04

Table S16: Spearman correlation matrix of landscape, climatic, and soil variables with Confidence Intervals not containing zero values from Non-Parametric Bootstrap (see Fig. 4, 5, and 6, and Table S13, S14, and S15). Lme: Land cover mean; Lsu: Land cover sum; DE: Shannon's equitability index; NNP: Number of no forest patches; NPD: No forest patch density; NMePA: Mean patch area of no forest; NFD: No Forest fractal dimension index; NLA: No forest like adjacencies; BLC: Forest land cover; BLP: Forest landscape proportion; BOC: Forest overall core area; BLA: Forest like adjacencies; Bio2: Temperature Annual Mean Diurnal Range; Bio3: Isothermality; Bio7: Annual Temperature Range; OCD: Organic Carbon Density; OCS: Soil Organic Carbon Stock; CF: Coarse Fragments. Bold values correspond to p-value <0.05 and Spearman correlation >0.8.

p-value/ Spearman correlation		Landscape													Climate			Soil		
		Lme	Lsu	DE	DS	NNP	NPD	NMePA	NFD	NLA	BLC	BLP	BOC	BLA	Bio2	Bio3	Bio7	OCD	OCS	CF
Landscape	Lme	-	1	0.48	0.45	-0.38	-0.38	0.67	0.19	0.65	-0.96	-0.96	-0.88	-0.88	-0.32	-0.31	-0.32	0.05	0.26	-0.12
	Lsu	0.00	-	0.48	0.45	-0.38	-0.38	0.67	0.19	0.65	-0.96	-0.96	-0.88	-0.88	-0.32	-0.31	-0.32	0.05	0.26	-0.12
	DE	0.01	0.01	-	0.71	-0.22	-0.21	0.51	0.09	0.54	-0.53	-0.53	-0.42	-0.42	-0.04	-0.02	-0.02	0.07	0.32	0.16
	DS	0.01	0.01	0.00	-	0.07	0.08	0.25	0.19	0.28	-0.38	-0.38	-0.38	-0.31	0.00	0.02	-0.02	-0.08	0.16	0.23
	NNP	0.03	0.03	0.23	0.7	-	1	-0.77	-0.33	-0.69	0.47	0.47	0.41	0.31	0.24	0.24	0.24	0.12	-0.13	0.11
	NPD	0.03	0.03	0.24	0.66	0.00	-	-0.77	-0.33	-0.68	0.46	0.46	0.41	0.31	0.24	0.24	0.23	0.13	-0.12	0.11
	NMePA	0.00	0.00	0.00	0.17	0.00	0.00	-	0.44	0.91	-0.79	-0.79	-0.77	-0.7	-0.38	-0.33	-0.41	0.10	0.40	-0.09
	NFD	0.31	0.31	0.62	0.29	0.06	0.06	0.01	-	0.31	-0.26	-0.26	-0.25	-0.22	-0.03	0.02	-0.03	-0.35	0.08	0.08
	NLA	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.08	-	-0.77	-0.77	-0.71	-0.59	-0.32	-0.26	-0.34	0.17	0.38	-0.04
	BLC	0.00	0.00	0.00	0.03	0.01	0.01	0.00	0.15	0.00	-	1	0.98	0.92	0.34	0.32	0.34	-0.12	-0.36	0.11
	BLP	0.00	0.00	0.00	0.03	0.01	0.01	0.00	0.15	0.00	0.00	-	0.98	0.92	0.34	0.32	0.34	-0.12	-0.36	0.11
	BOC	0.00	0.00	0.00	0.03	0.02	0.02	0.00	0.17	0.00	0.00	0.00	-	0.96	0.37	0.35	0.38	-0.16	-0.39	0.13
BLA	0.00	0.00	0.02	0.08	0.08	0.09	0.00	0.22	0.00	0.00	0.00	0.00	-	0.4	0.38	0.43	-0.18	-0.37	0.21	
Climate	BIO2	0.08	0.08	0.83	0.98	0.19	0.19	0.03	0.88	0.08	0.06	0.06	0.04	0.02	-	0.97	0.98	-0.35	-0.37	0.08
	BIO3	0.08	0.08	0.92	0.92	0.19	0.19	0.06	0.93	0.14	0.08	0.08	0.05	0.03	0.00	-	0.94	-0.24	-0.28	0.03
	BIO7	0.08	0.08	0.89	0.92	0.19	0.20	0.02	0.88	0.06	0.06	0.06	0.03	0.01	0.00	0.00	-	-0.38	-0.34	0.18
Soil	OCD	0.77	0.77	0.70	0.67	0.50	0.48	0.57	0.05	0.36	0.50	0.50	0.40	0.32	0.05	0.18	0.03	-	0.62	-0.17
	OCS	0.15	0.15	0.07	0.40	0.49	0.52	0.02	0.68	0.03	0.04	0.04	0.03	0.03	0.04	0.12	0.06	0.00	-	0.1
	CF	0.51	0.51	0.37	0.21	0.53	0.54	0.64	0.65	0.84	0.55	0.55	0.49	0.25	0.65	0.87	0.33	0.36	0.58	-