Supplemental Information

Figures.

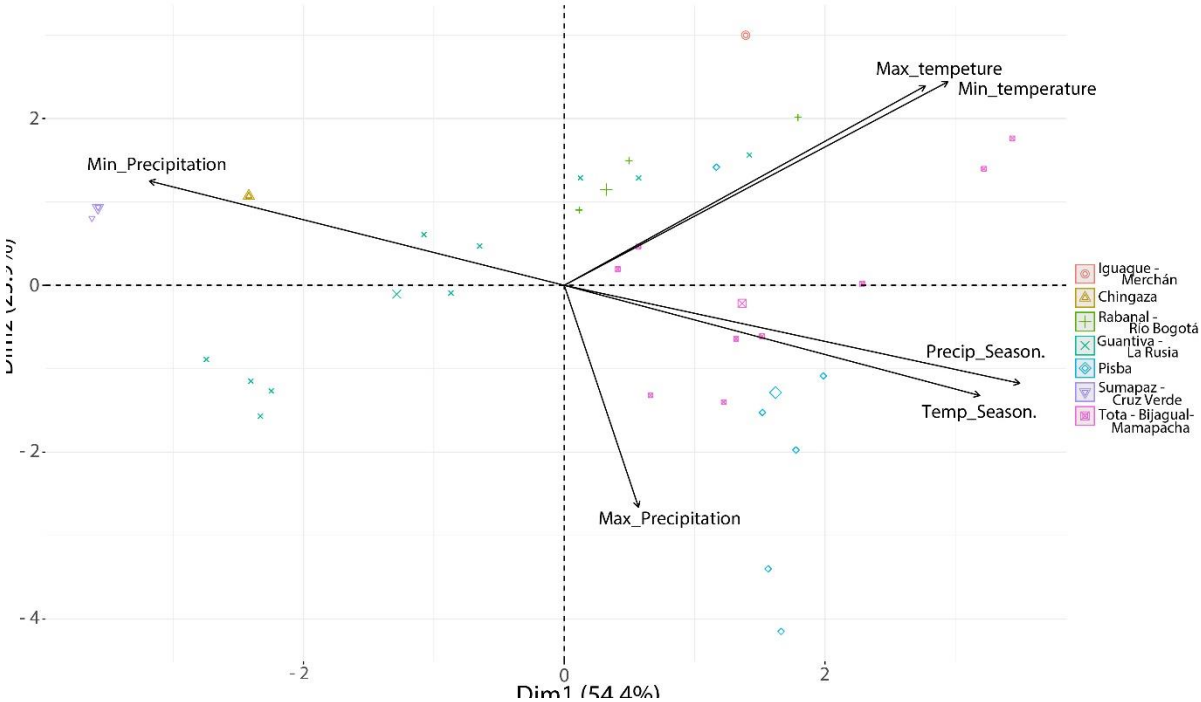

Figure S1: Climate variability over the seven páramo complexes six variables were used: minimum precipitation (Min_Precipitation), maximum precipitation (Max_Precipitation), minimum temperature (Min_temperature), maximum temperature (Max_temperature), temperature seasonality (Temp_Season.) and precipitation seasonality (Precip_Season.). The data was taken from worldclim (Fick & Hijmans, 2017)

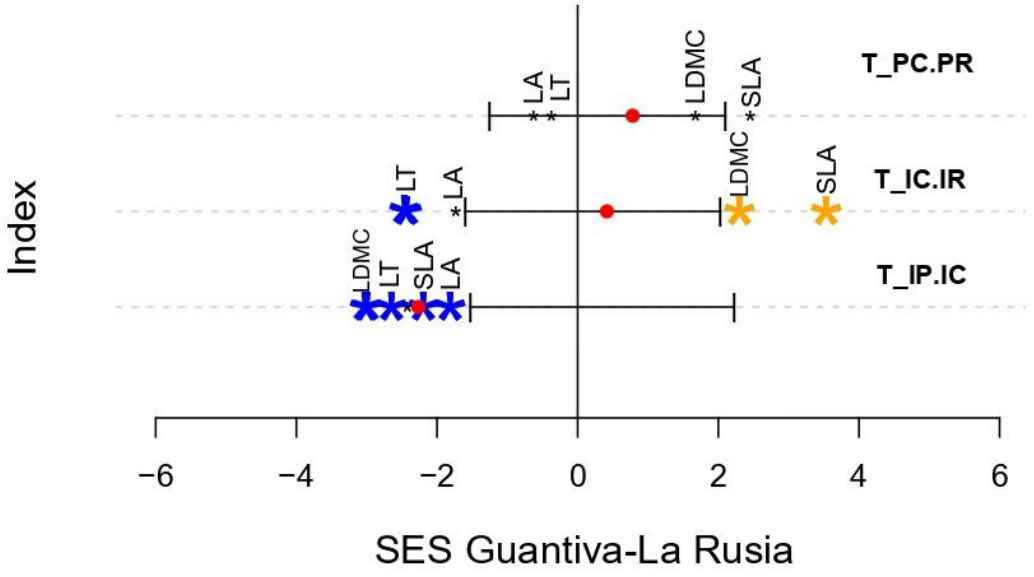

Figure S2: Standardized effect size (SES) of the four functional traits evaluated for three T-statistics for Guantiva-La Rusia. Blue asterisks indicate significantly lower differences compared to the null models ($p < 0.05$). Yellow asterisks indicate significantly higher differences compared to the null models ($p < 0.05$). Red dots show the average SES of all traits for each T-statistic. LA: leaf area, SLA: specific leaf area, LDMC: leaf dry matter content, LT: leaf thickness. T_IP.IC refers to the ratio observed between the variance of the population and the total variance of the community at the individual level. T_IC.IR refers to the ratio between the variance of each community and the total variance of the regional pool at the individual level. T_PC.PR refers to the ratio between the variance of each community and the total variance of the regional pool but at the population level, ergo, it is calculated with the average trait value for each population.

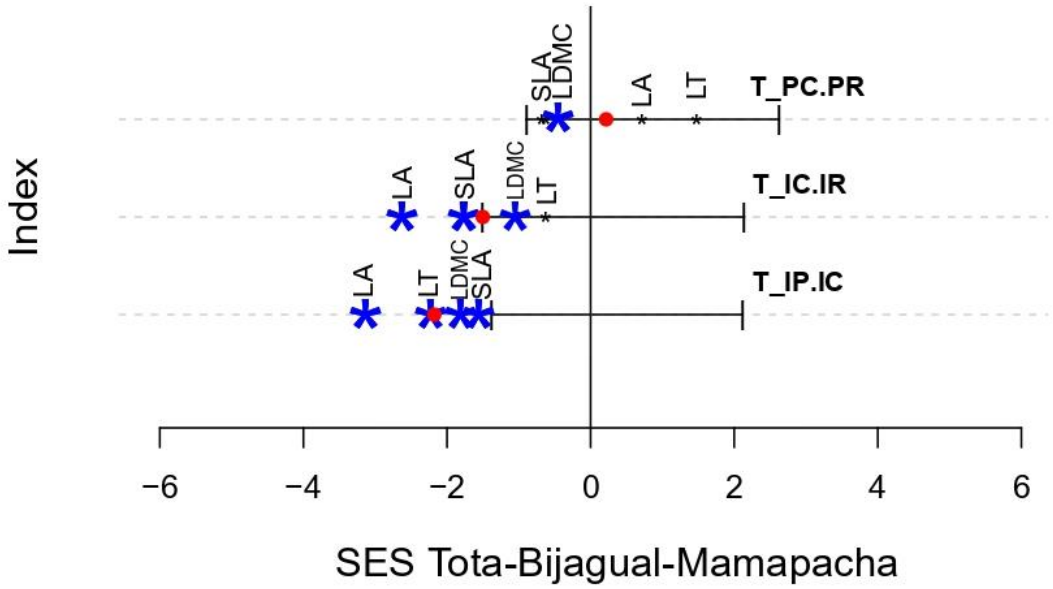

Figure S3: Standardized effect size (SES) of the four functional traits evaluated for three T-statistics for Tota-Bijagual-Mamapacha. Blue asterisks indicate significantly lower differences compared to the null models ($p < 0.05$). Red dots show the average SES of all traits for each T-statistic. LA: leaf area, SLA: specific leaf area, LDMC: leaf dry matter content, LT: leaf thickness. T_IP.IC refers to the ratio observed between the variance of the population and the total variance of the community at the individual level. T_IC.IR refers to the ratio between the variance of each community and the total variance of the regional pool at the individual level. T_PC.PR refers to the ratio between the variance of each community and the total variance of the regional pool but at the population level, ergo, it is calculated with the average trait value for each population.

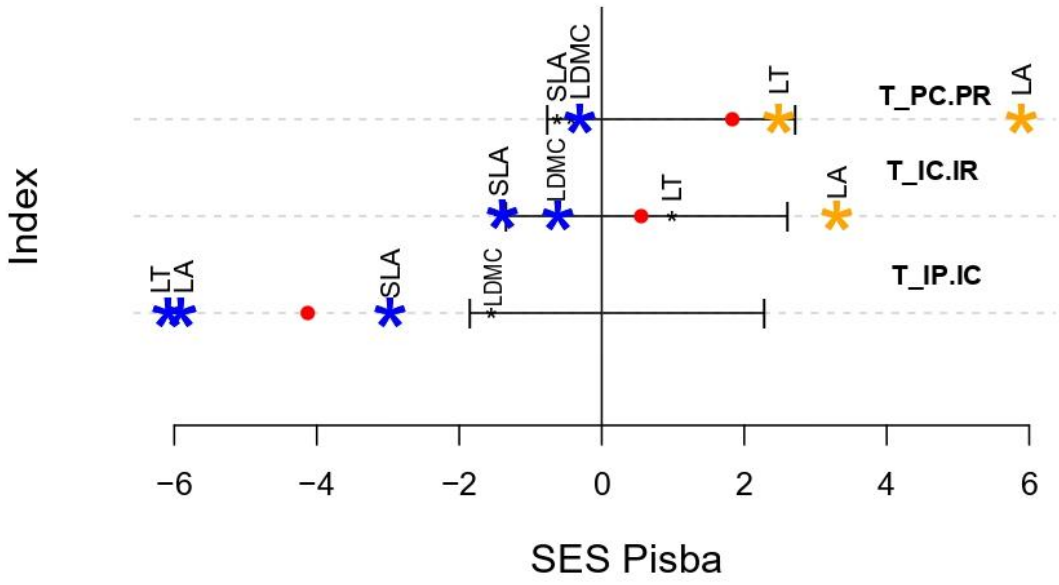

Figure S4: Standardized effect size (SES) of the four functional traits evaluated for three T-statistics for Pisba. Blue asterisks indicate significantly lower differences compared to the null models ($p < 0.05$). Yellow asterisks indicate significantly higher differences compared to the null models ($p < 0.05$) Red dots show the average SES of all traits for each T-statistic. LA: leaf area, SLA: specific leaf area, LDMC: leaf dry matter content, LT: leaf thickness. T_IP.IC refers to the ratio observed between the variance of the population and the total variance of the community at the individual level. T_IC.IR refers to the ratio between the variance of each community and the total variance of the regional pool at the individual level. T_PC.PR refers to the ratio between the variance of each community and the total variance of the regional pool but at the population level, ergo, it is calculated with the average trait value for each population.

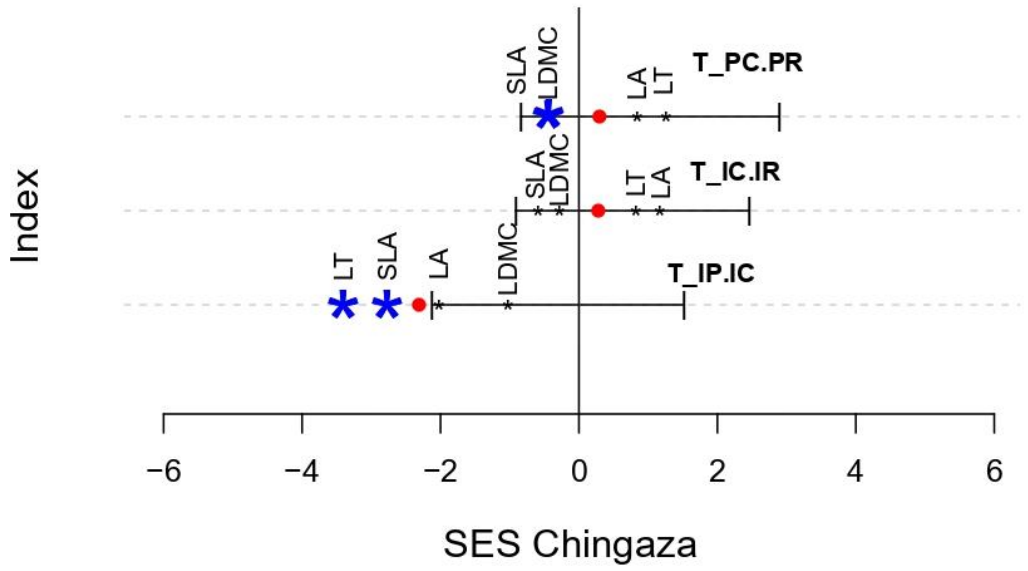

Figure S5: Standardized effect size (SES) of the four functional traits evaluated for three T-statistics for Chingaza. Blue asterisks indicate significantly lower differences compared to the null models ($p < 0.05$). Red dots show the average SES of all traits for each T-statistic. LA: leaf area, SLA: specific leaf area, LDMC: leaf dry matter content, LT: leaf thickness. T_IP.IC refers to the ratio observed between the variance of the population and the total variance of the community at the individual level. T_IC.IR refers to the ratio between the variance of each community and the total variance of the regional pool at the individual level. T_PC.PR refers to the ratio between the variance of each community and the total variance of the regional pool but at the population level, ergo, it is calculated with the average trait value for each population.

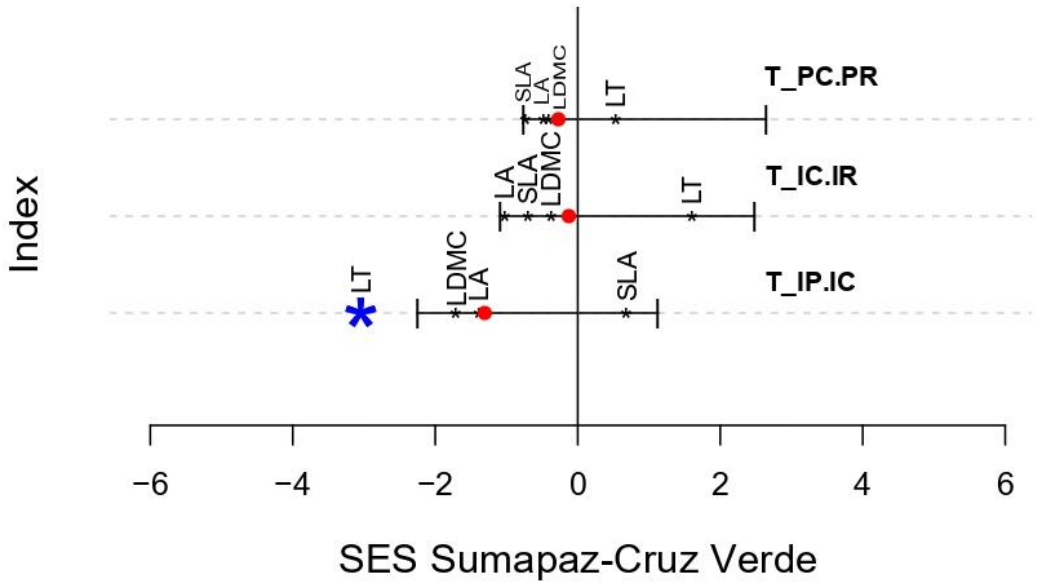

Figure S6: Standardized effect size (SES) of the four functional traits evaluated for three T-statistics for Sumapaz-Cruz Verde. Blue asterisks indicate significantly lower differences compared to the null models ($p < 0.05$). Red dots show the average SES of all traits for each T-statistic. LA: leaf area, SLA: specific leaf area, LDMC: leaf dry matter content, LT: leaf thickness. T_IP.IC refers to the ratio observed between the variance of the population and the total variance of the community at the individual level. T_IC.IR refers to the ratio between the variance of each community and the total variance of the regional pool at the individual level. T_PC.PR refers to the ratio between the variance of each community and the total variance of the regional pool but at the population level, ergo, it is calculated with the average trait value for each population.

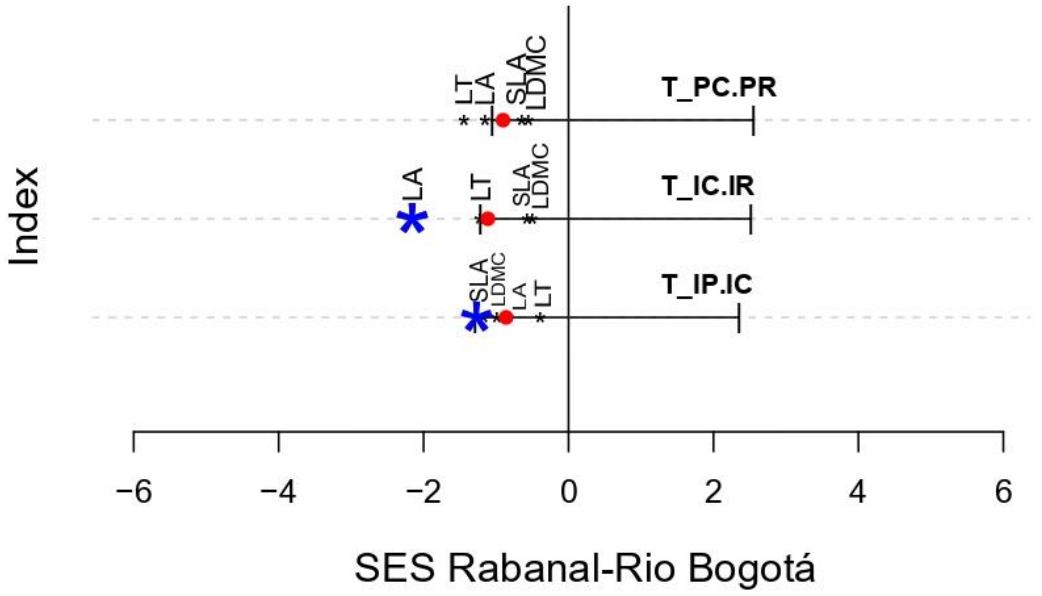

Figure S7: Standardized effect size (SES) of the four functional traits evaluated for three T-statistics for Rabanal-Río Bogotá. Blue asterisks indicate significantly lower differences compared to the null models ($p < 0.05$). Red dots show the average SES of all traits for each T-statistic. LA: leaf area, SLA: specific leaf area, LDMC: leaf dry matter content, LT: leaf thickness. T_IP.IC refers to the ratio observed between the variance of the population and the total variance of the community at the individual level. T_IC.IR refers to the ratio between the variance of each community and the total variance of the regional pool at the individual level. T_PC.PR refers to the ratio between the variance of each community and the total variance of the regional pool but at the population level, ergo, it is calculated with the average trait value for each population.

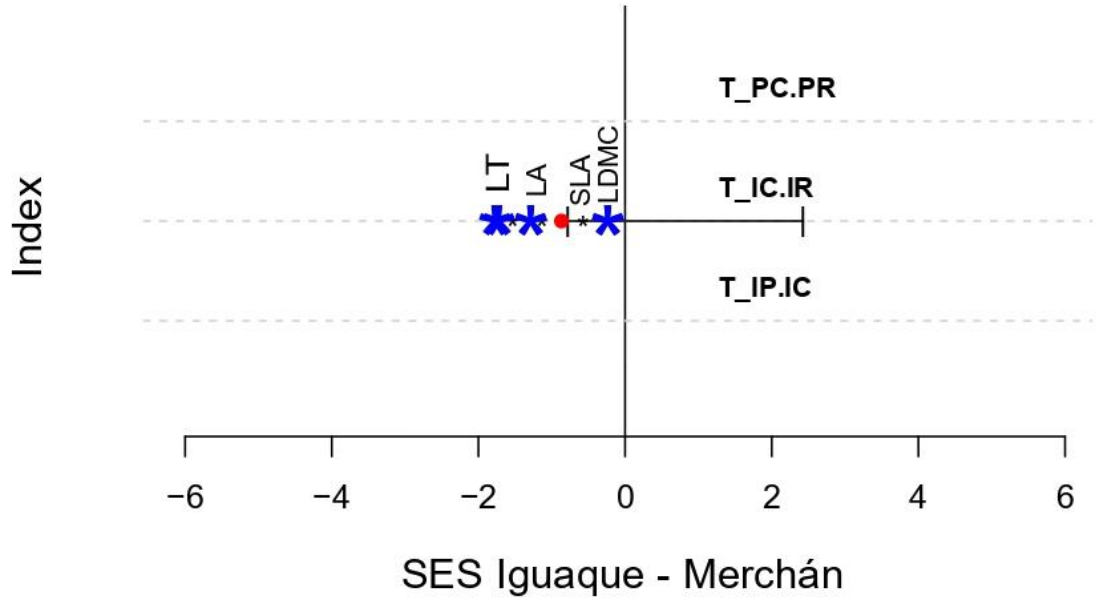

Figure S8: Standardized effect size (SES) of the four functional traits evaluated for three T-statistics for Iguaque-Merchán. Blue asterisks indicate significantly lower differences compared to the null models ($p < 0.05$). Red dots show the average SES of all traits for each T-statistic. LA: leaf area, SLA: specific leaf area, LDMC: leaf dry matter content, LT: leaf thickness. T_IP.IC refers to the ratio observed between the variance of the population and the total variance of the community at the individual level. T_IC.IR refers to the ratio between the variance of each community and the total variance of the regional pool at the individual level. T_PC.PR refers to the ratio between the variance of each community and the total variance of the regional pool but at the population level, ergo, it is calculated with the average trait value for each population.

Tables.

Table S1:

Number of páramo complexes where each of the nine functional units identified by the best normal mixture model (NMM) were found to occur (diagonal) and co-occur with other groups (off diagonal).

Functional Unit	1	2	3	4	5	6	7	8	9
1	6	6	3	1	1	3	5	1	1

2	7	3	1	1	3	5	1	1
3		3	1	0	3	3	1	1
4			1	0	1	1	1	1
5				1	0	0	0	0
6					3	3	1	1
7						5	1	1
8							1	1
9								1

Table S2:

Number of individuals belonging to each functional unit.

Functional Unit	# Individuals
1	37
2	83
3	15
4	6
5	4
6	16
7	20
8	1
9	4

Table S3:

Differences in the number of morphospecies collected and functional units found for each páramo complex.

Complex	# Morphospecies	# Functional units
Guantiva – La rusia	11	8
Pisba	5	3
Iguaque – Merchán	1	1
Tota-Bijagual-Mamapacha	11	5
Chingaza	2	3
Guacheneque	4	5
Sumapaz-Cruz Verde	2	3

Table S4:

p-values of the two unilateral statistical tests performed (lower and upper limit) to compare the T statistics with the random expectations, according to each functional trait and pàramo complex. P-values < 0,05 (bold) represent significant differences between the null models and the observed values. (LA: leaf area, SLA: specific leaf area, LDMC: leaf dry matter content, LT: leaf thickness)

Complex	T-statistic	LA	SLA	LDMC	LT
Guantiva - La Rusia	T_IP.IC.inf	**0,02**	**0,01**	**0,01**	**0,01**
	T_IP.IC.sup	0,99	1,00	1,00	1,00
	T_IC.IR.inf	0,05	1,00	0,99	**0,01**
	T_IC.IR.sup	0,96	**0,01**	**0,02**	1,00
	T_PC.PR.inf	0,31	0,96	0,93	0,42
	T_PC.PR.sup	0,7	0,05	0,08	0,59
Pisba	T_IP.IC.inf	**0,01**	**0,01**	0,08	**0,01**
	T_IP.IC.sup	1,00	1,00	0,93	1,00
	T_IC.IR.inf	1,00	**0,02**	**0,01**	0,83
	T_IC.IR.sup	**0,01**	0,99	1,00	0,18
	T_PC.PR.inf	1,00	0,27	**0,03**	0,97
	T_PC.PR.sup	**0,01**	0,74	0,98	**0,04**
Iguaque-Merchàn	T_IP.IC.inf	**0,01**	**0,01**	**0,01**	**0,01**
	T_IP.IC.sup	**0,01**	**0,01**	**0,01**	**0,01**
	T_IC.IR.inf	**0,01**	0,16	**0,03**	**0,01**
	T_IC.IR.sup	1,00	0,85	0,98	1,00
	T_PC.PR.inf	**0,01**	**0,01**	**0,01**	**0,01**
	T_PC.PR.sup	**0,01**	**0,01**	**0,01**	**0,01**
Tota - Bijagual - Mamapacha	T_IP.IC.inf	**0,01**	**0,01**	**0,01**	**0,01**
	T_IP.IC.sup	1,00	1,00	1,00	1,00
	T_IC.IR.inf	**0,01**	**0,03**	**0,04**	0,22
	T_IC.IR.sup	1,00	0,98	0,97	0,79
	T_PC.PR.inf	0,88	0,33	**0,03**	0,90
	T_PC.PR.sup	0,13	0,68	0,98	0,11
Chingaza	T_IP.IC.inf	0,07	**0,02**	0,17	**0,01**
	T_IP.IC.sup	0,94	0,99	0,84	1,00
	T_IC.IR.inf	0,87	0,34	0,23	0,82
	T_IC.IR.sup	0,14	0,67	0,78	0,19
	T_PC.PR.inf	0,81	0,42	**0,02**	0,85
	T_PC.PR.sup	0,20	0,59	0,99	0,16
Rabanal – Rio Bogotà	T_IP.IC.inf	0,20	**0,04**	0,06	0,38
	T_IP.IC.sup	0,81	0,97	0,95	0,63
	T_IC.IR.inf	**0,01**	0,39	0,39	0,10
	T_IC.IR.sup	1,00	0,62	0,62	0,91
	T_PC.PR.inf	0,08	0,35	0,05	0,06
	T_PC.PR.sup	0,93	0,66	0,96	0,95
Sumapaz-Cruz Verde	T_IP.IC.inf	0,15	0,70	0,10	**0,01**
	T_IP.IC.sup	0,86	0,31	0,91	1,00
	T_IC.IR.inf	0,14	0,17	0,12	0,92
	T_IC.IR.sup	0,87	0,84	0,89	0,09

T_PC.PR.inf	0,44	0,09	0,07	0,75
T_PC.PR.sup	0,57	0,92	0,94	0,26

Table S5:

Morphospecies belonging to each functional unit

Functional Unit	Morphospecies
1	*E. summapacis, E. murilloi, E. flor alta amarilla, E. hoja amarilla tres flor, E.paipana, E.uribei, E.tunjana, E. hoja amarilla flor alta , E.boyacensis, E. pisbana, E. episcopalis, E. lopezii, E.bracteasrojas, E.pleiochasia*
2	*E. summapacis, E. murilloi, E. pleiochasia, E. nemenekei, E. congestiflora, E. garciae, E. flor alta amarilla, E. flor ramificada, E.tunjana, E. hoja amarilla tres flor, E.uribei, E.tunjana, E. ramosa, E.boyacensis, E. jaramilloi, E.killipii, E.bracteasrojas, E.corymbosa, E.brachyaxiantha, E.tresflores, E.incana, E.hoja gruesa tres flores*
3	*E.congestiflora, E.guacharaca, E.muiska, E.murilloi, E.corymbosa, E.boyacensis*
4	*E.pleiochasia, E.brachyaxiantha, E.tresflores*
5	*E.killipii, E. summapacis*
6	*E.murilloi, E.guacharaca, E. ramosa, E.bracteasrojas, E.corymbosa, E.brachyaxiantha, E.boyacensis, E.tresflores,*

7	*E.murilloi, E. argentea, E.tunjana, E. boyacensis, E. jaramilloi, E.tresflores, E.corymbosa*
8	*E. boyacensis*
9	*P. glandulosus*