

CWR-derived potatoes integrated in breeding pipelines for climate change resilience of farming communities of Cuba, Ecuador, Kenya and Peru. (CIP/BOLD)

Resistance to late blight and molecular, morphological and ecogeographical characterization of Ecuadorian potato wild relatives

Lizeth Ojeda; Álvaro Monteros A.



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Activity 1.2.6. Characterization of potato wild relatives collected in Ecuador and conserved in the Ecuadorian genebank (INIAP) for LB resistance

Activity 1.2.7. Morphological, molecular and ecogeographical characterization of potato wild relatives collected in Ecuador



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Solanum spp. accessions studied



S. albornozii

13 acc



S. minutifoliolum

14 acc



S. colombianum

24 acc



S. chomatophilum

7 acc



S. andreanum

24 acc



S. albicans

4 acc



S. chillasense

4 acc



S. acaule

1 acc

**Total:
91 acc**



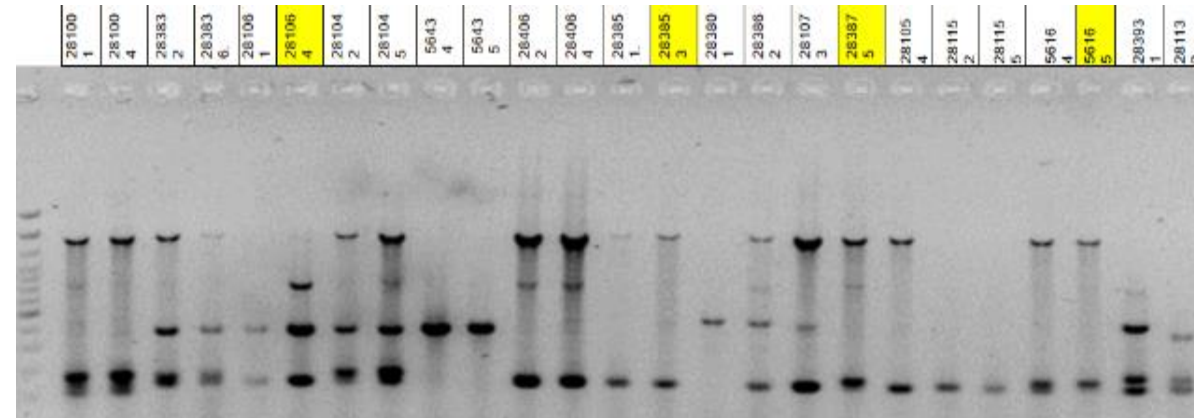
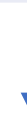
Activity 1.2.6. Characterization of potato wild relatives collected in Ecuador and conserved in the Ecuadorian genebank (INIAP) for LB resistance

Molecular markers associated with late blight resistance

- 76-2SF2/76-2SR (gen R1)
- Prp1 (gen glutation-S-transferasa)



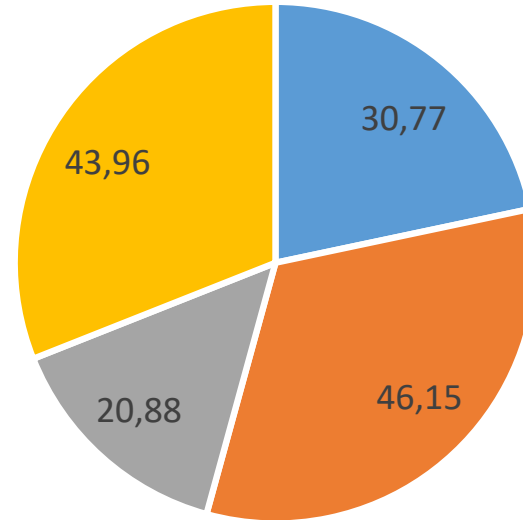
<i>S. acaule</i>	1
<i>S. albicans</i>	4
<i>S. albornozii</i>	13
<i>S. andreanum</i>	24
<i>S. chilliasense</i>	4
<i>S. chomatophilum</i>	7
<i>S. colombianum</i>	24
<i>S. minutifolium</i>	14



Molecular markers associated with late blight resistance

Plant No. 1		
Molecular marker	# samples	%
Prp1	29	31.87
76-2S	43	47.25
Prp1-76-2S	19	20.88
No marker*	39	42.86
Total accessions	91	

Plant No. 2		
Molecular marker	# samples	%
Prp1	27	29.67
76-2S	41	45.05
Prp1-76-2S	19	20.88
None*	41	45.05
Total accessions	91	



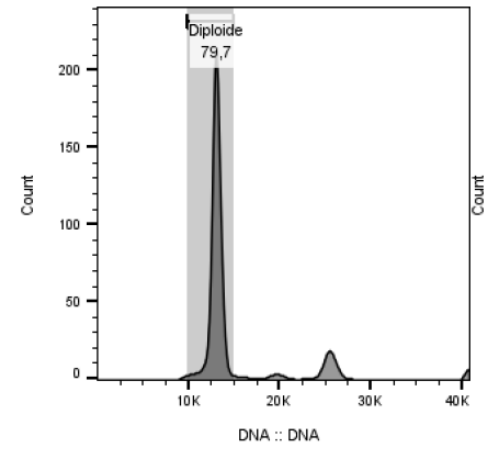
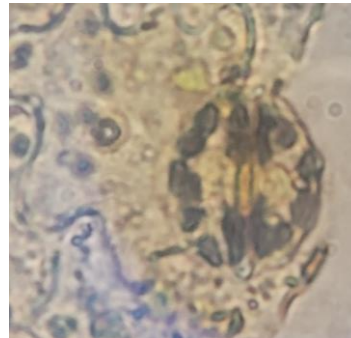
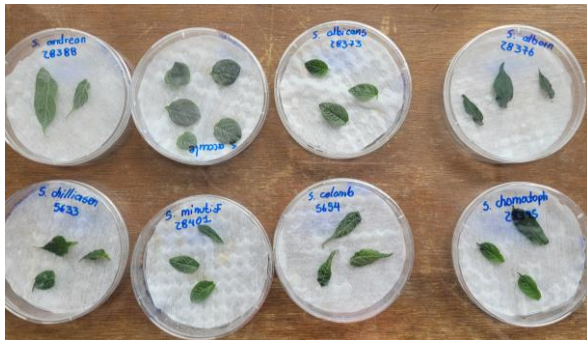
■ Prp1 ■ 76-2S ■ Prp1-76-2S ■ Ningún marcador*

<i>S. chilliasense</i>	Does not amplify any marker
<i>S. albicans and S. albornozii</i>	They have less amplification of the two molecular markers
<i>S. andreanum</i>	Highest percentage of R1 gene amplification (75%)
<i>S. colombianum</i>	Highest percentage of <i>gst1</i> gene amplification (63%)



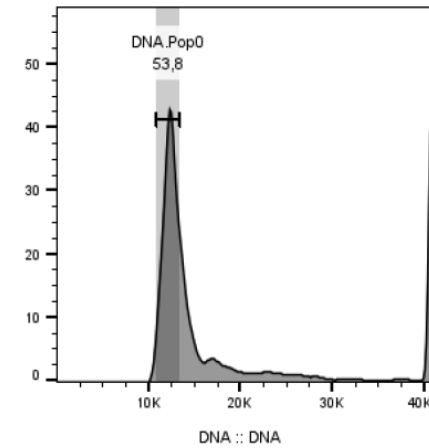
Ploidy determination

Chloroplast count in stomatal guard cells



Control diploide

Control Chaucha Blanca;
Establecimiento de región de especies
diploides.



Solanum colombianum
ECU- 28115

Results:
69 accesiones

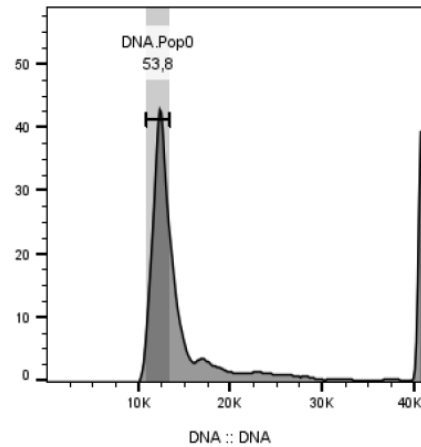
28115; Se identifica dos picos, uno en la zona Diploide, y otro menor en la zona tetraploide. Planta diploide.



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Ploidy determination



28115; Se identifica dos picos, uno en la zona Diploide, y otro menor en la zona tetraploide. Planta diploide.

S. acaule							Reference
Ploidy	2x	3x	4x	6x	7x	8x	4x
Number of accessions			1				
Percentage			100%				
Total accessions	1						
S. albicans							Reference
Ploidy	2x	3x	4x	6x	7x	8x	6x
Number of accessions	1	1		2			
Percentage	25%	25%		50%			
Total accessions	4						
S. albornozii							Reference
Ploidy	2x	3x	4x	6x	7x	8x	2x
Number of accessions	7	2					
Percentage	78%	22%					
Total accessions	9						
S. andreanum							Reference
Ploidy	2x	3x	4x	6x	7x	8x	2x, 4x
Number of accessions	13	2	1				
Percentage	81%	13%	6%				
Total accessions	16						
S. chilliasense							Reference
Ploidy	2x	3x	4x	6x	7x	8x	2x
Number of accessions	2						
Percentage	100%						
Total accessions	2						
S. chomatophilum							Reference
Ploidy	2x	3x	4x	6x	7x	8x	2x
Number of accessions	2	2					
Percentage	50%	50%					
Total accessions	4						
S. colombianum							Reference
Ploidy	2x	3x	4x	6x	7x	8x	2x, 4x
Number of accessions	3	8	10		1	1	
Percentage	13%	35%	43%		4%	4%	
Total accessions	23						
S. minutifoliolum							Reference
Ploidy	2x	3x	4x	6x	7x	8x	2x
Number of accessions	9	1					
Percentage	90%	10%					
Total accessions	10						

Activity 1.2.7. Morphological, molecular and ecogeographical characterization of potato wild relatives collected in Ecuador



Morphological characterization:

D1	Growth habit type	D21	Predominant tuber skin colour
D2	Leaf dissection type	D22	Predominant tuber intensity colour
D3	Number of primary lateral leaflets	D23	Secondary tuber skin colour
D4	Number of interjected leaflets between primary lateral leaflets	D24	Distribution of secondary tuber colour
D5	Number of interjected leaflets on petiole	D25	General tuber shape
D6	Stem color	D26	Unusual tuber shape
D7	Stem wing shape	D27	Depth of tuber eyes
D8	Degree of flowering	D28	Predominant tuber flesh colour
D9	Corolla shape	D29	Secondary tuber flesh colour
D10	Predominant flower colour	D30	Distribution of secondary tuber flesh color
D11	Predominant flower colour intensity	D31	Predominant sprout colour
D12	Secondary flower colour	D32	Secondary sprout colour
D13	Distribution of secondary flower colour	D33	Distribution of secondary sprout colour
D14	Anther pigments	D34	Days to flowering
D15	Pistil pigments	D35	Days to fruiting
D16	Calyx colour	D36	Yield
D17	Pedicel colour	D37	Days to sprouting
D18	Fruit colour	D38	Stem size
D19	Fruit shape	D39	Flower size
D20	Maturity		

Descriptors: 30 qualitatives, 9 quantitatives



Figura 1. Esquemas de los hábitos de crecimiento de las plantas de papa

Descriptors for the Cultivated Potato

Guía para las Caracterizaciones Morfológicas en Papa (Octubre, 2000)

Guía para las Caracterizaciones Morfológicas Básica en Colecciones de Papas Nativas.

Por: René Gómez¹
(Texto revisado por la Dra. Teresa Ames)

II.- Forma de la Hoja (abcd) (Fig. 2)

a	b	c	d
TIPO DE DISECCION	NUMERO FOLIOLOS LATERALES	NUMERO INTER-HOJUELAS ENTRE FOLIOLOS LATERALES	NUMERO INTER-HOJUELAS SOBRE PECIOLULOS
1 Entera	0 Ausente	0 Ausente	0 Ausente
2 Lobulada	1 par	1 par	1 par
3 Disectada	2 pares	2 pares	2 pares
	3 pares	3 pares	3 pares
	4 pares	4 o más pares	4 o más pares
	5 pares		
	6 pares		
	7 o más pares		

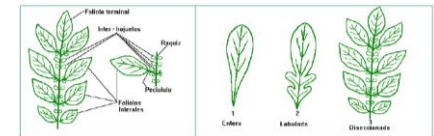


Figura 2. Esquemas de las partes de las hojas compuestas de las plantas de papa y tipo disecion.

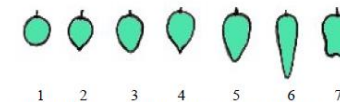


Figura 10. Esquema de las formas de las bayas de papa.

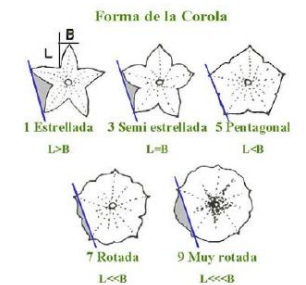


Figura 5. Esquemas de las formas de la corola de las flores de papa, donde B = ancho del pétalo, L = longitud desde la unión de dos pétalos vecinos hasta el acumen.



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Morphological characterization



S. andreanum



S. albornozii



S. chilliasense



S. acaule



S. albicans



S. chomatophilum



S. colombianum

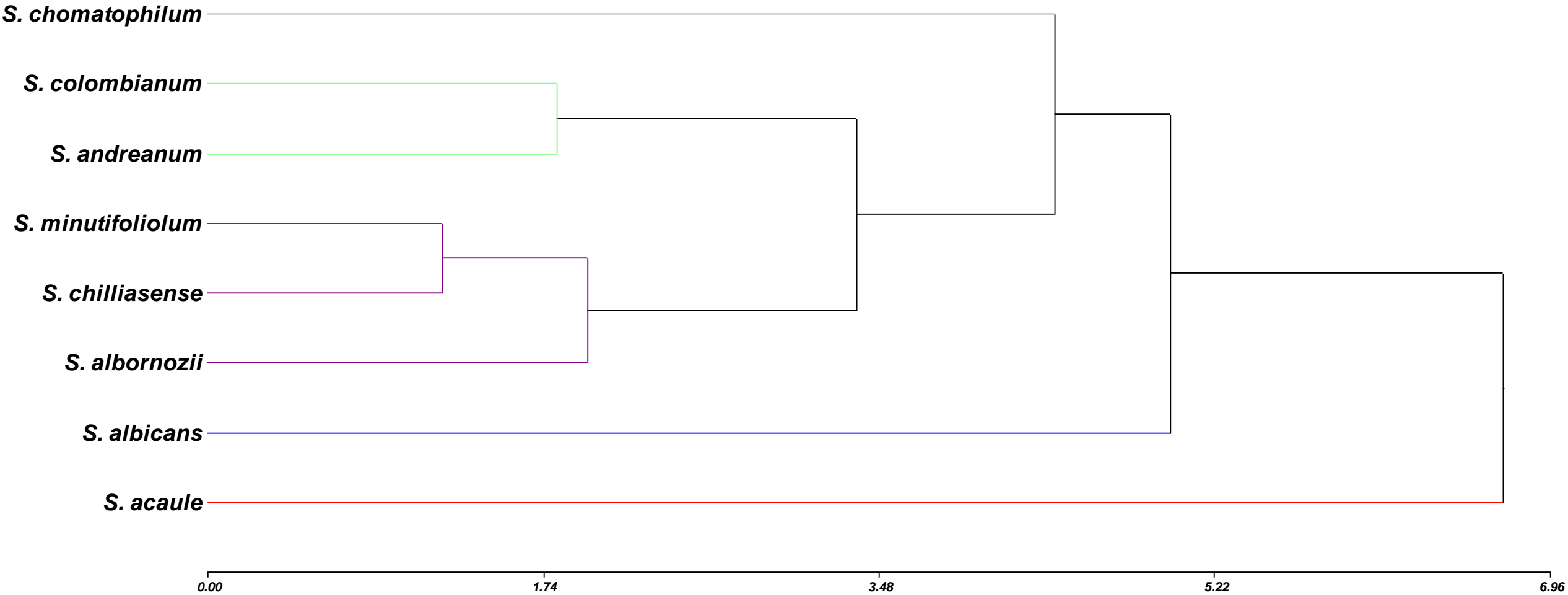


S. minutifoliolum



Morphological characterization

Ward
Distancia: (Euclidea)



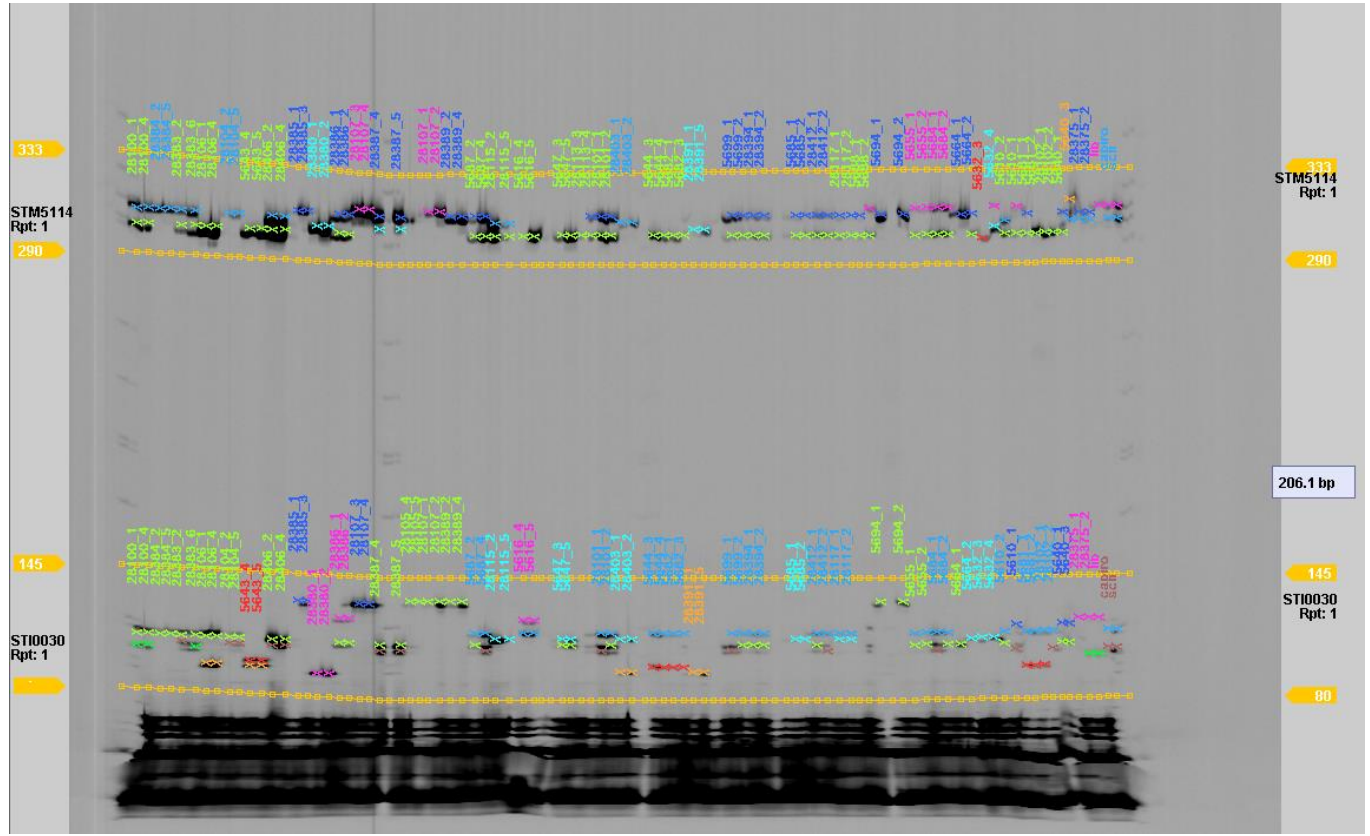
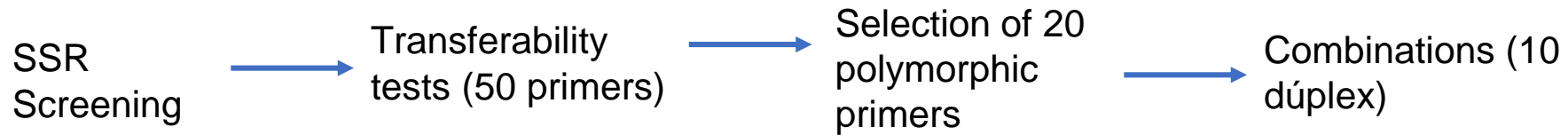
8 qualitative descriptors



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Molecular characterization (SSRs)

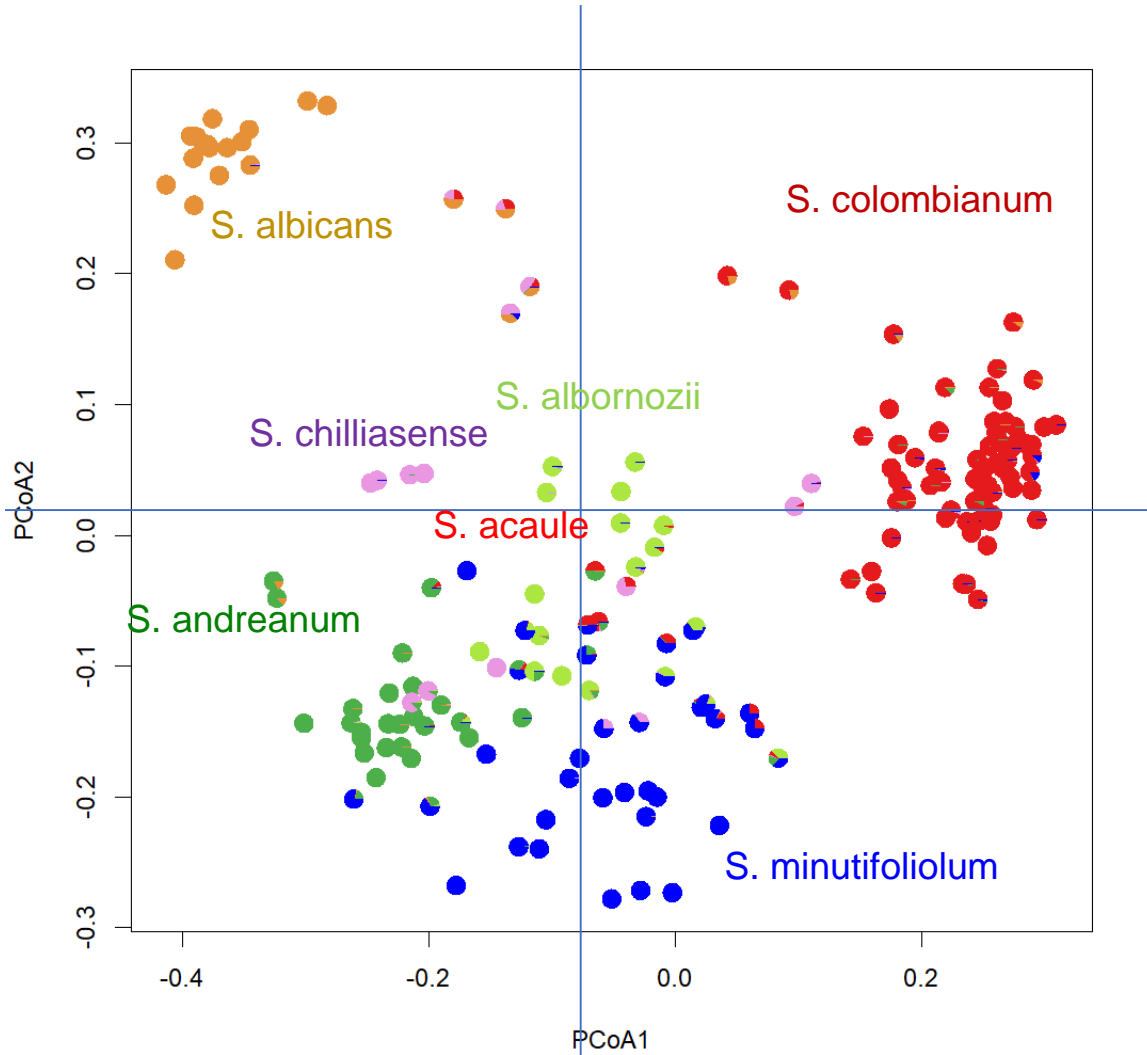


PCo and Dendrogram

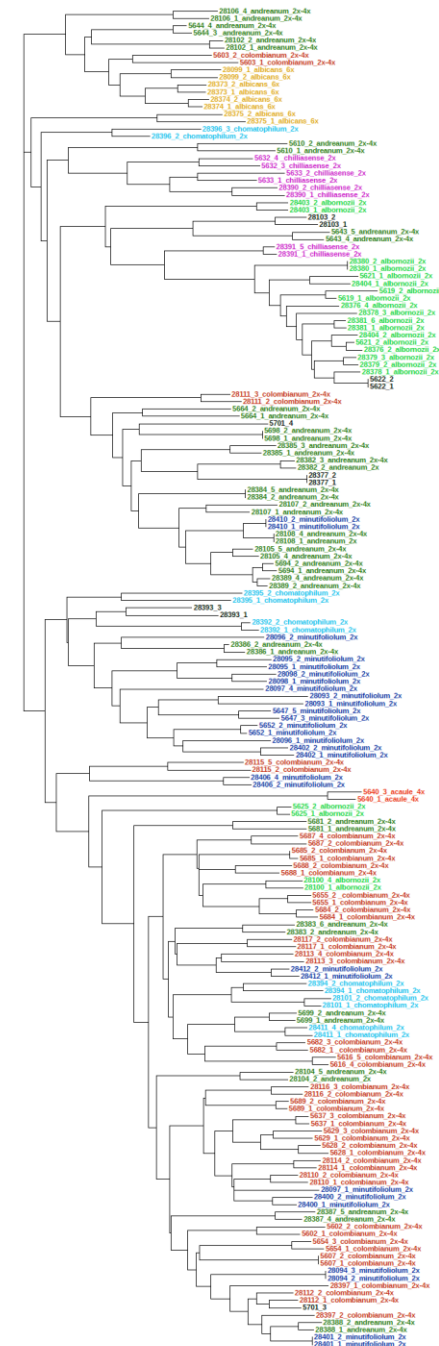
Tree scale: 0.05

K4

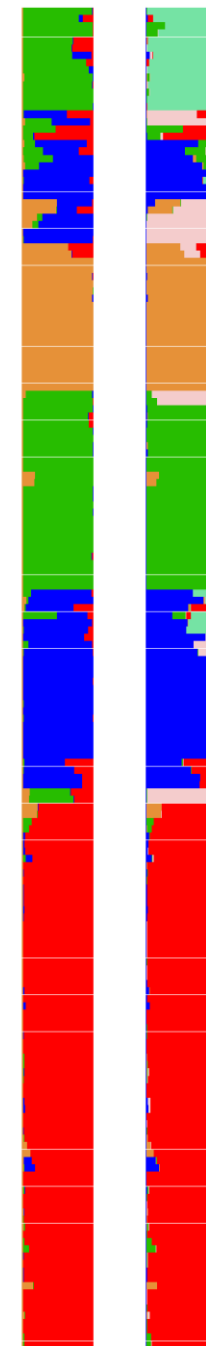
K6



Bruvo



- *S. acaule*
- *S. albicans*
- *S. albornozii*
- *S. andreanum*
- *S. colombianum*
- *S. chilliasense*
- *S. chomatophilum*
- *S. minutifoliolum*



Ecogeographic characterization

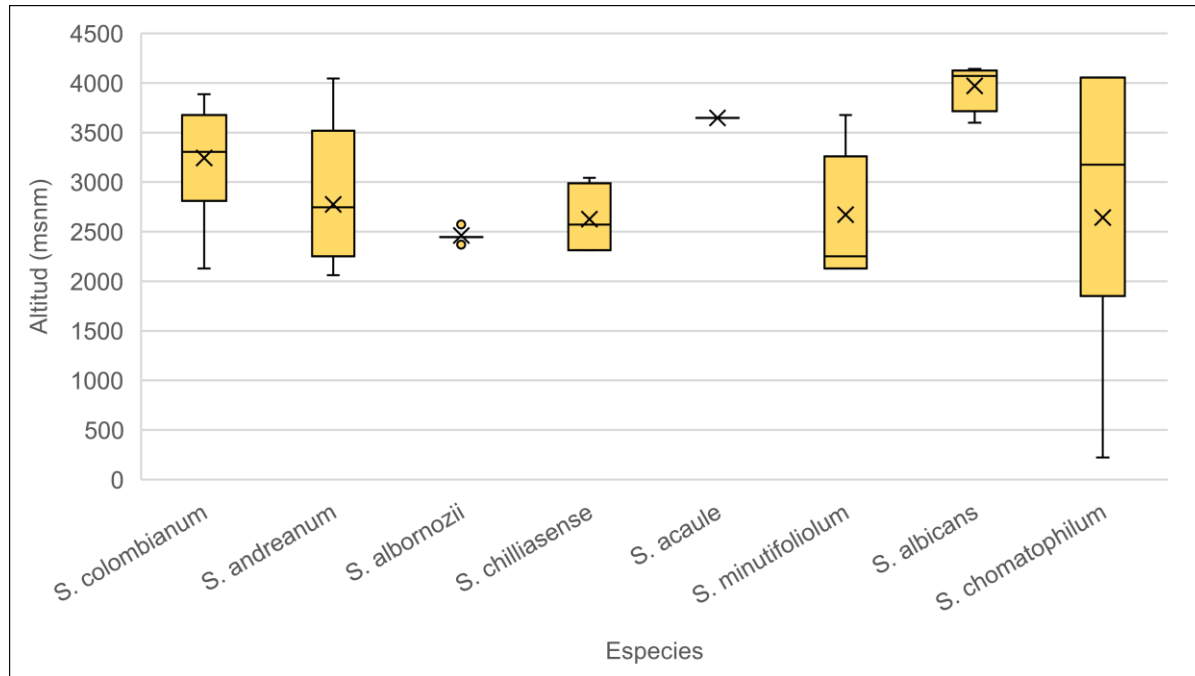
Component	Variable	Unidad de medida
Bioclimatic	Annual mean temperature	°C
	Temperature seasonality	°C
	Annual precipitation	mm
	Prec coldest quarter	mm
	Average precipitation 12	mm
	Max temp 11	°C
	Max temp 2	°C
	Max temp 7	°C
	Min temp 12	°C
	Min temp 6	°C
	Min temp 7	°C
	Mean temp wettest quarter	°C
	Mean temp coldest quarter	°C
	Elevation	msnm
	Slope	degrees
Geophysical		
	Solar radiat annual	Kj m-2 day -1
	Wind speed annual	m/s
Edaphic	Clay content top	% weight
	Sand content sub	% weight
	Sand content top	% weight
	Organic carbon content top	% weight
	Silt content top	% weight
	Soil pH H2O sub	-log (H++)
	Soil pH H2O top	-log (H++)



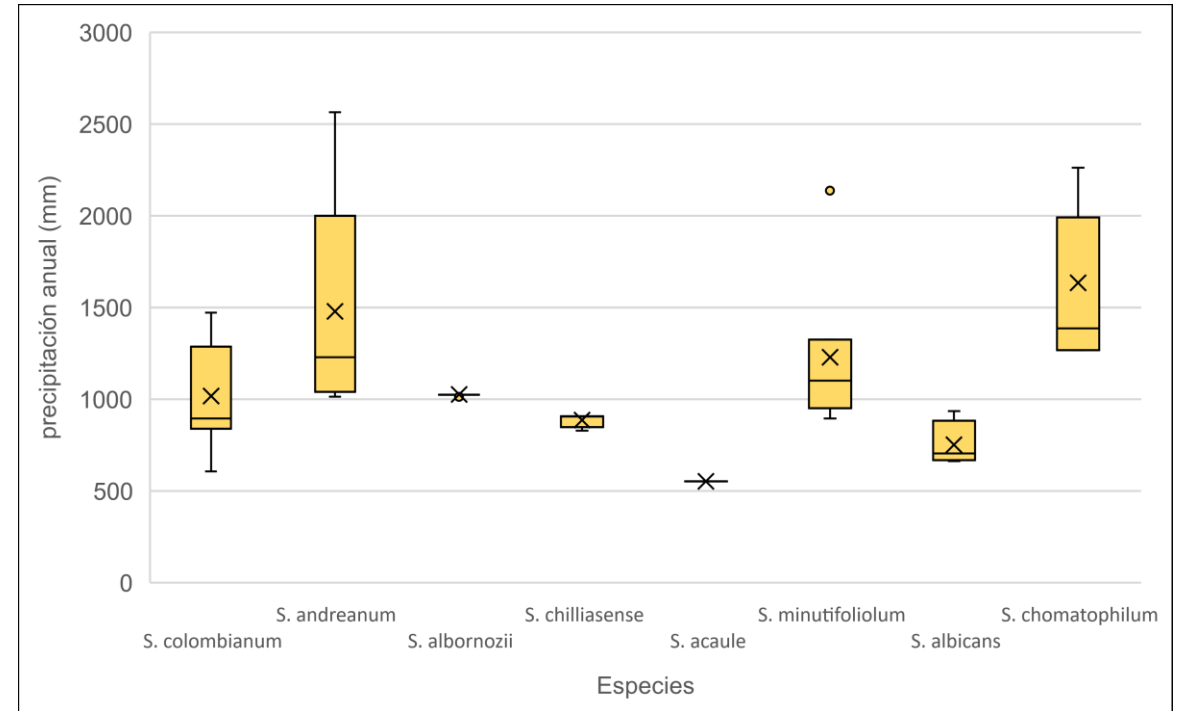
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Ecogeographic characterization



Altitude m asl

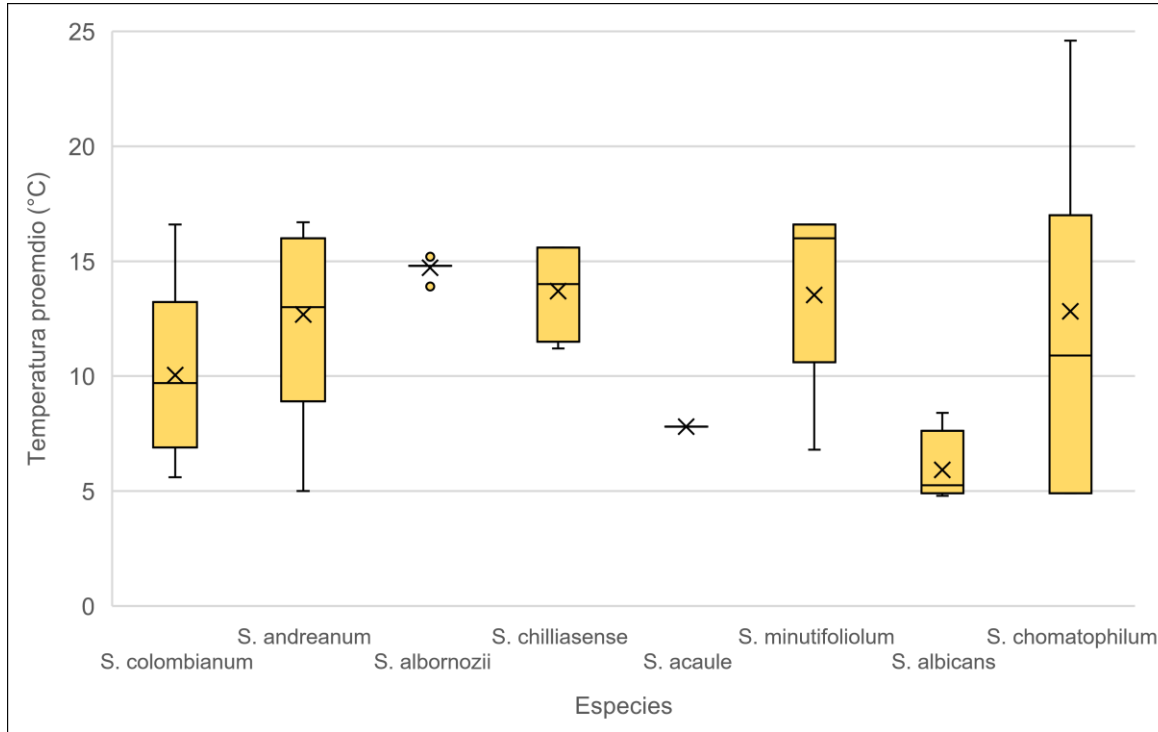


Annual precipitation (mm)

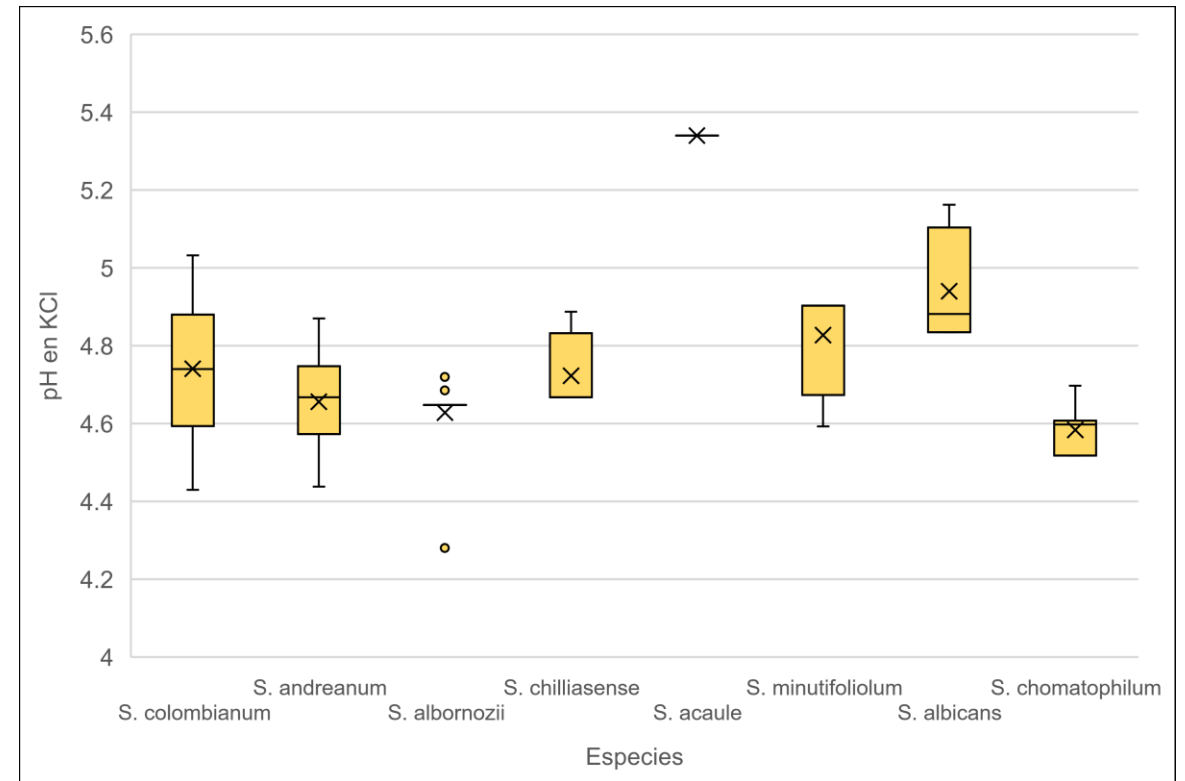




Ecogeographic characterization



Average temperature °C



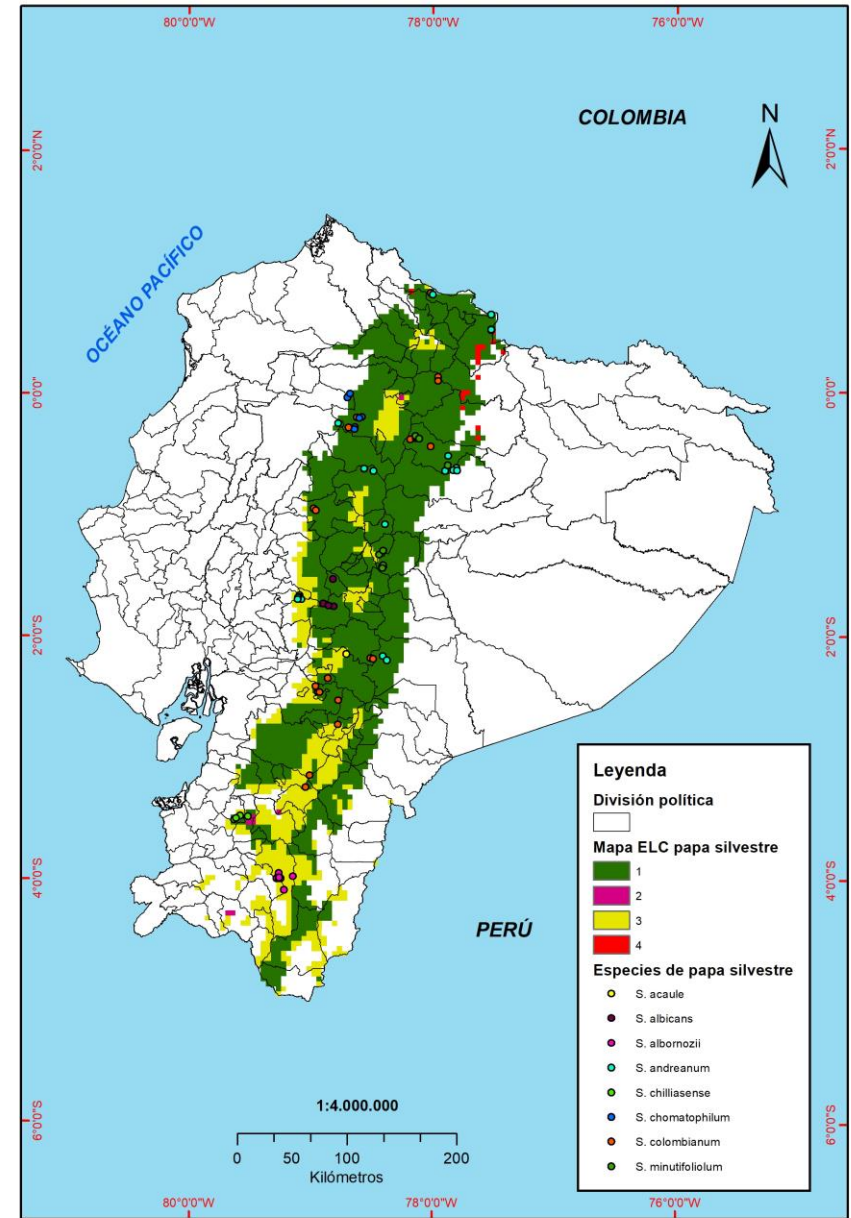
pH





Ecogeographic characterization

ELC MAP Ecological Land Classification



THANKS
GRACIAS

Alvaro.monteros@iniap.gob.ec



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