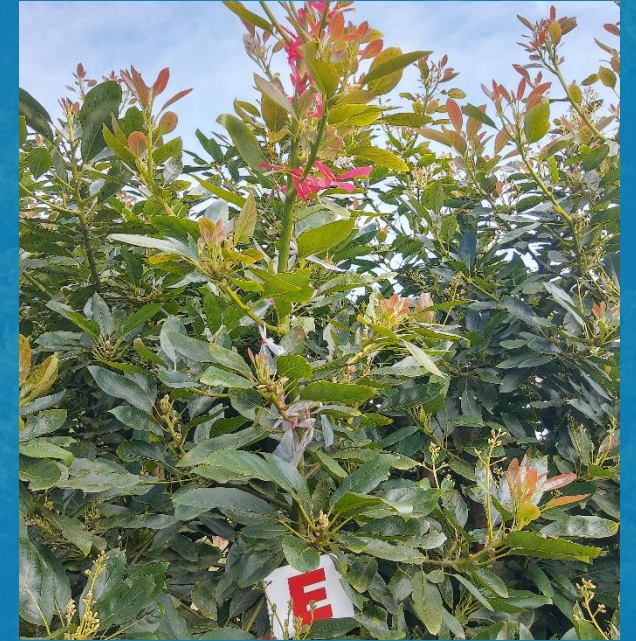


HASS AVOCADO PHENOLOGY IN THE ANDEAN TROPICS OF CALDAS, COLOMBIA

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INTRODUCTION



+ of 35,000 ha and
growing



Lack of knowledge of
ecophysiological behavior



Differences in growth and
productivity



+ research, better
management and support

MATERIALS AND METHODS

Vegetal material

- Avocado Hass - 5-7 years
- Rootstock from native seed

Selection and variables

- Two contrasting zones (1.950m Aranzazu – 2.400m Villamaría)
- 15 trees – branches, apical buds of lateral shoots, inflorescences and fruits.
- Fate of shoot apical buds, floral phenology, root growth, AHU, harvesting, climatic variables

Design and analysis

- CRD – 15 replicates and subreplicates (shoots)
- Analysis of variance and Tukey tests ($p \leq 0.05$) – SAS (SAS Inst, Cary N.C. Version 9.4)





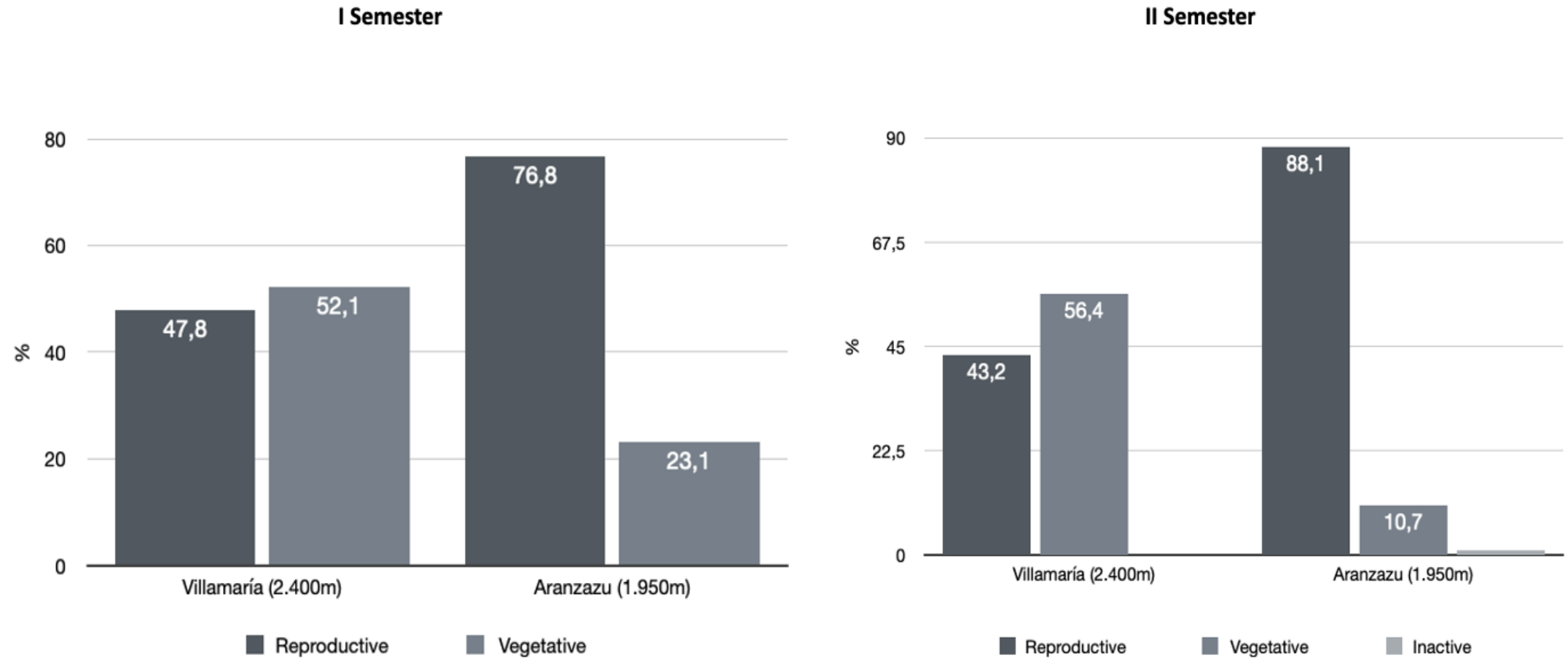
Apical bud of growing side shoot with unobservable fate



Epicormic shoot (spiral)

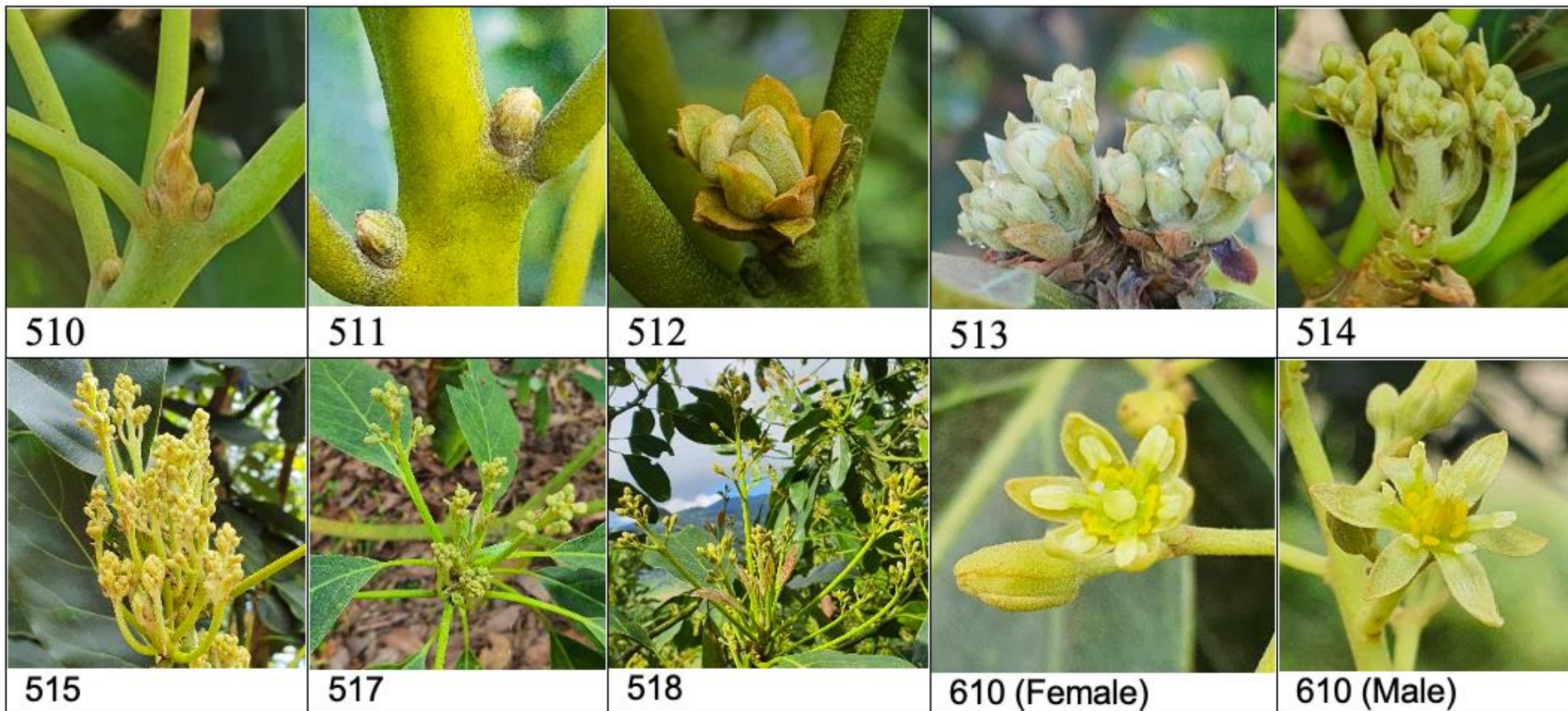
Sileptic lateral shoot

RESULTS AND DISCUSSION



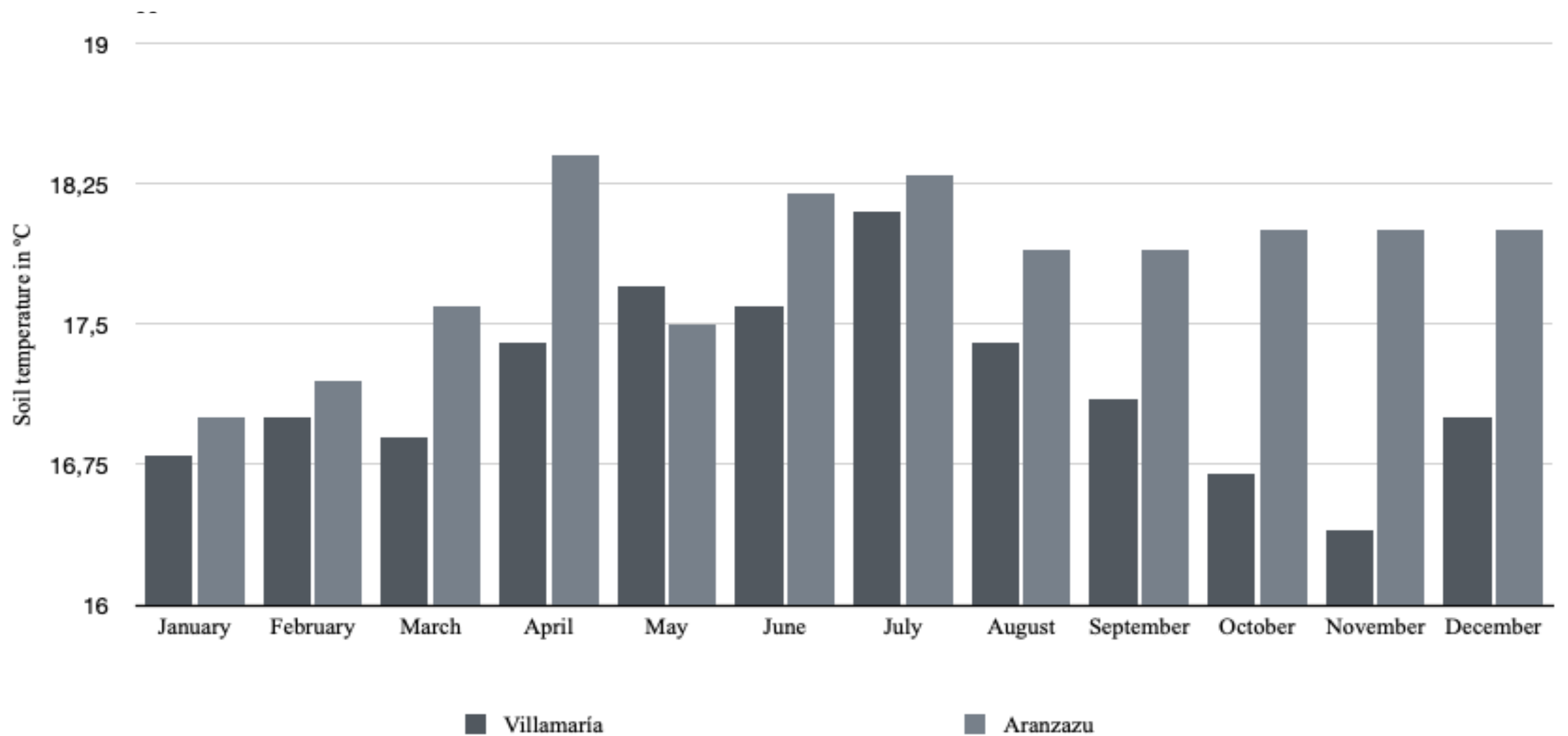
Relative intensity of apical buds of lateral shoots in the first and second half of 2021 in two contrasting zones of the Andean tropics of Caldas.





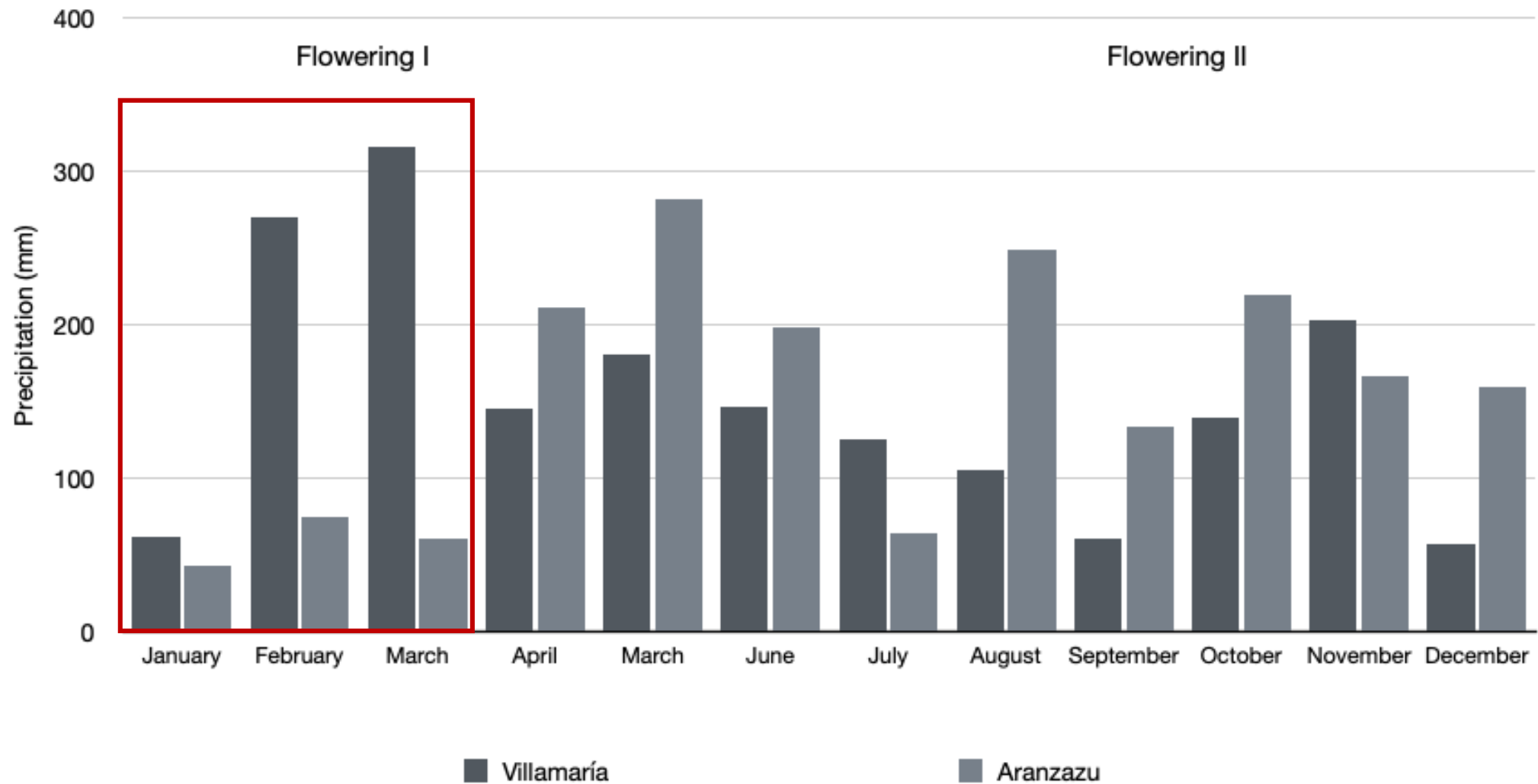
Photos: Arias-García et al., 2021

The time elapsed between stage 510 (dormant reproductive buds), and stage 610 (first open flowers) according to the phenological scale of (Alcaraz et al., 2013), had differences for the two orchards (localities), registered 110 days for anthesis in the municipality of Aranzazu (1950m), and 131 days in the municipality of Villamaría (2400m).



(Ploetz *et al.*, 1991; Ploetz *et al.*, 1993; Thorp *et al.*, 1995; Rocha-Arroyo *et al.*, 2011; Mickelbart *et al.*, 2012)

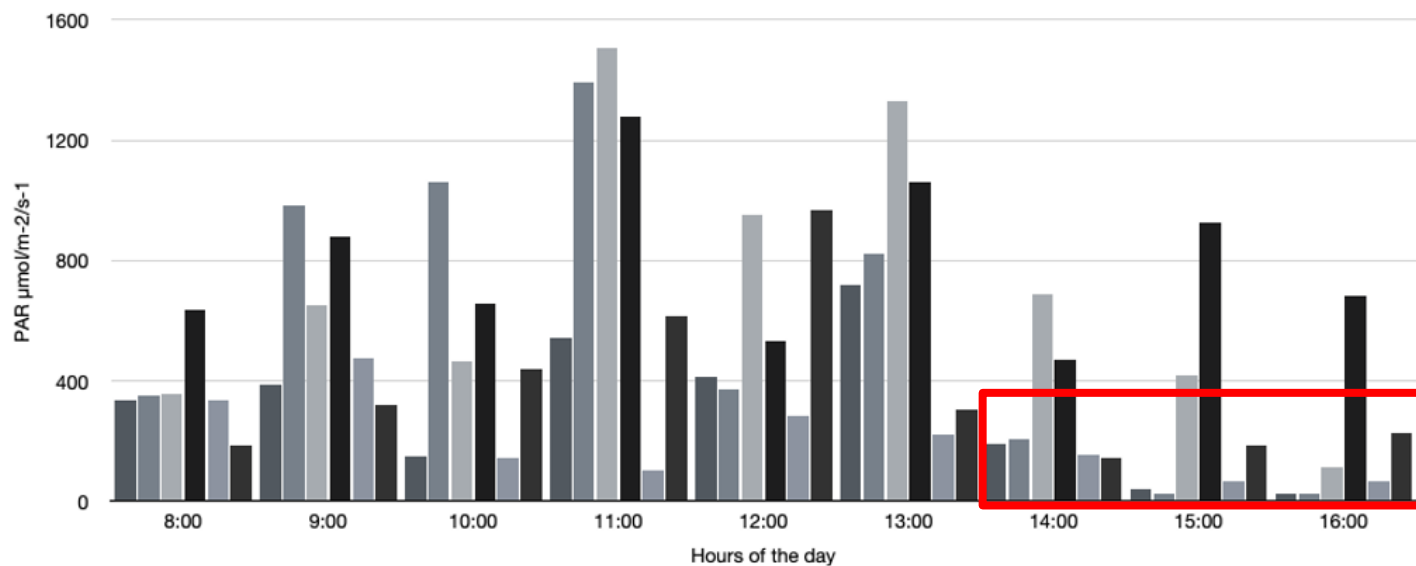
(Whiley *et al.*, 1989; Yusof *et al.*, 1969; Lahav & Trochoulis, 1982; De Villiers, A., & Ernst, A; 2015).



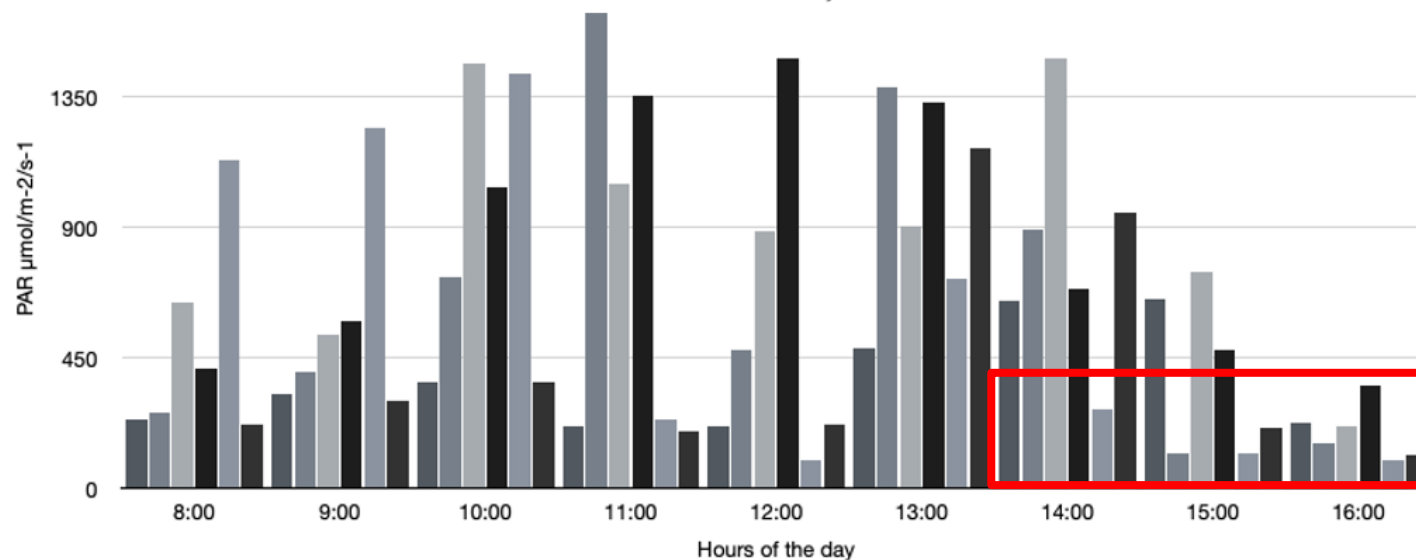
Precipitation in two contrasting areas of the Andean tropics of Caldas.

Photosynthetically Active Radiation (PAR)

Villamaría: 2400 m



Aranzazu: 1950 m



Accumulated heat units (AHU) at flowering

Developmental stages until flowering	Days elapsed		Degree days of development (°d)	
	Villamaría	Aranzazu	Villamaría	Aranzazu
A-C	36	13	246,65	115,4
C-D	46	61	301	600,2
D-E	36	22	235,55	232,3
E-F	13	14	79,5	148,6
Total	131	110	862,7	1096,55

*A-C: from reproductive bud in dormancy (510), to buds near to budbreak (512). C-D: from (512) to secondary axis visible in the inflorescence (514). D-E: from (514) to yellow bud (515). E-F: from (515) to anthesis (610).



Chávez-Bárcenas *et al.* (2008) Salazar-García *et al.* (2016)

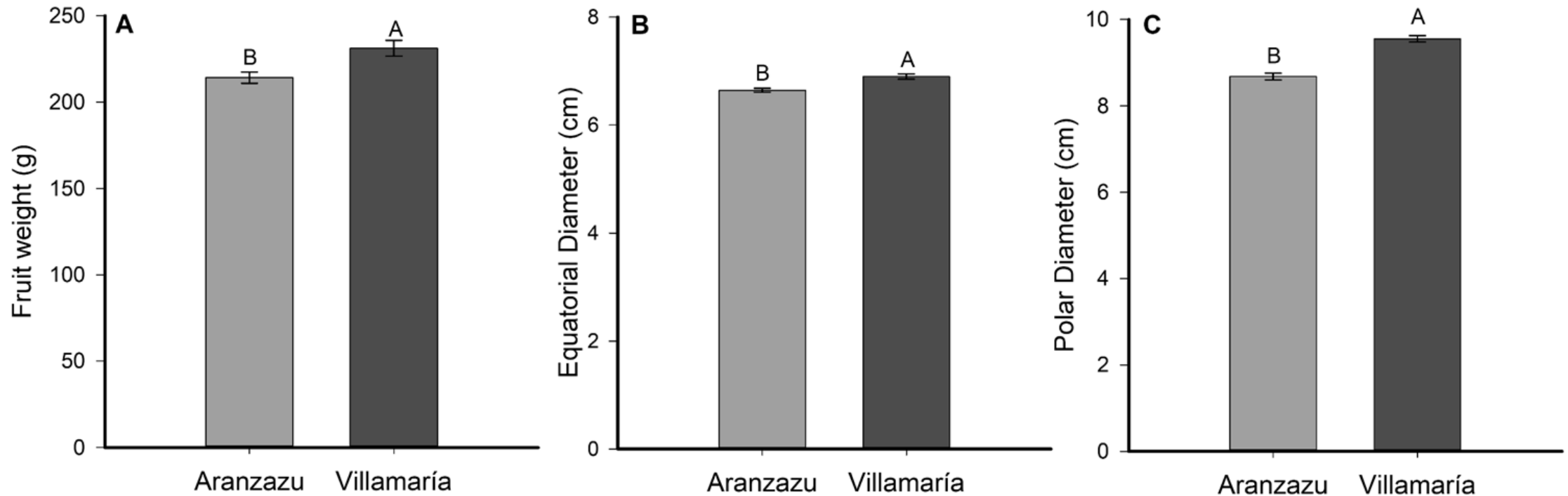
Accumulated heat units (AHU) to harvest

Stage of development until harvest	Days elapsed	
	Villamaría	Aranzazu
A-C	355	279
Total	2.092,72	2.530,9

*A-C: from flower anthesis to harvest.



Fruit characteristics at harvest by zone



Villamaría: 2400 m
Aranzazu: 1950 m

Aranzazu (1950m)

Villamaría (2400m)

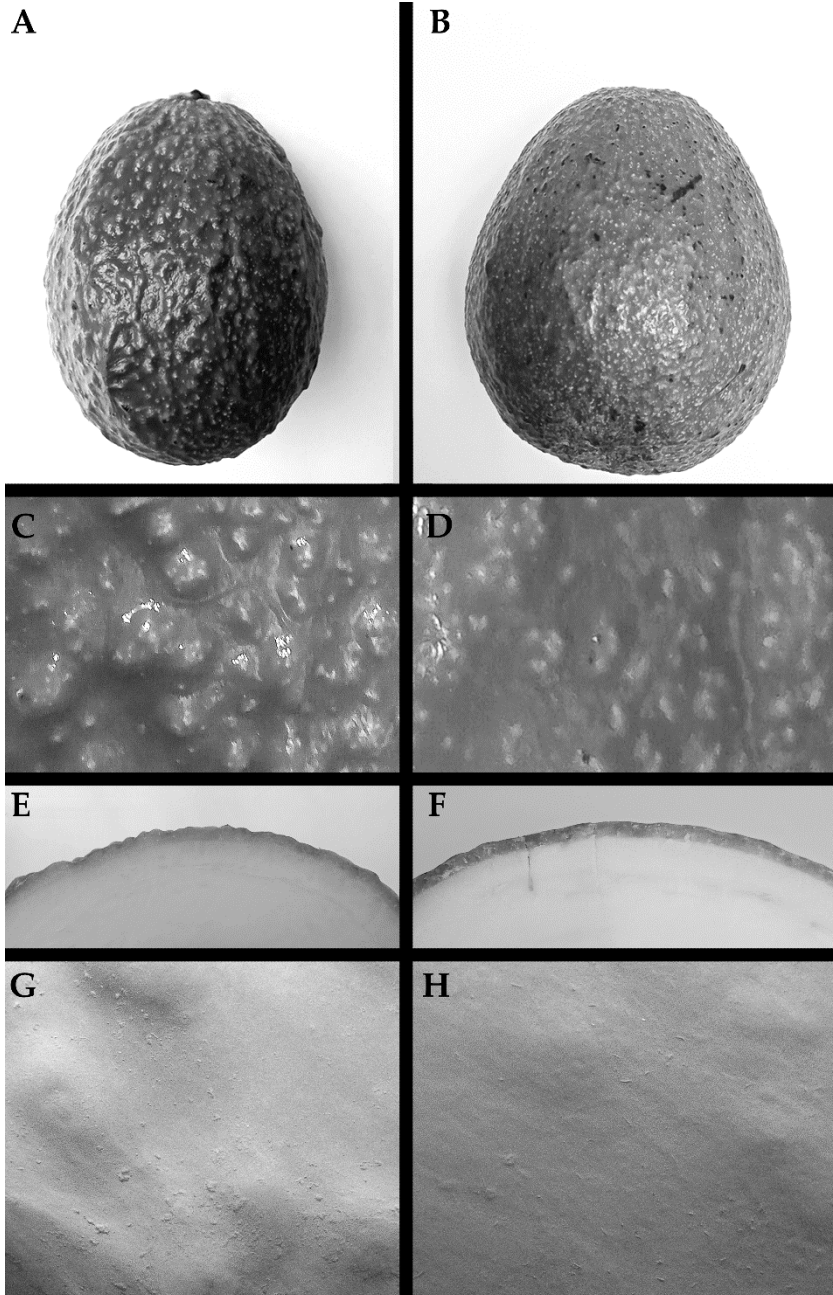


Figure 9. Macroscopic image of the fruit (A-B), 3cm x 3cm image of the fruit epidermis (C-D), transversal image of the fruit skin and pulp (E-F), microscopic image of the fruit epidermis of 2 mm (G-H) from two contrasting areas of the Andean tropics of Caldas, Colombia.



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Questions

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