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Physicochemical characterization and bioactive compounds of *Anisophyllea boehmii* Engl.: A wild fruit from Angola

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Keywords: *Anisophyllea boehmii*, wild fruit, nutritional quality

Context, Motivation, Research Problem

Fruits are an important source of nutrients such as carbohydrates, minerals, vitamins, fiber and bioactive compounds such as polyphenols and carotenoids that contribute to the proper functioning of the vital functions of the human body. The choice of this fruit is justified by the high frequency of consumption observed and the lack of nutritional information.

Objective

Study the physicochemical characteristics, focusing on bioactive compounds such as carotenoids and polyphenols present in the fruit *Anisophyllea boehmii* Engl. harvested in 3 regions of Angola: Malanje (AbM), Huambo (AbHb) and Huíla (AbHa).

Methodology

The samples were collected in the provinces of Malanje, Huambo and Huíla between 2021 and 2022 (Fig 1). Approximately 3 kg of pulp from each sample were preserved, and later analyzed and compared.



Fig 1. Plant and fruit of *Anisophyllea boehmii*

As for dry matter, pH, total acidity (TA), total soluble solids (°Brix), were analyzed using the classical methods, insoluble fibers using the Van Soest method, proteins by Dumas method, total ashes and minerals using the ICP – AES* method, organic acids and sugars by HPLC. Bioactive compounds were analyzed globally by spectrophotometry and individually by HPLC (Fig. 2).

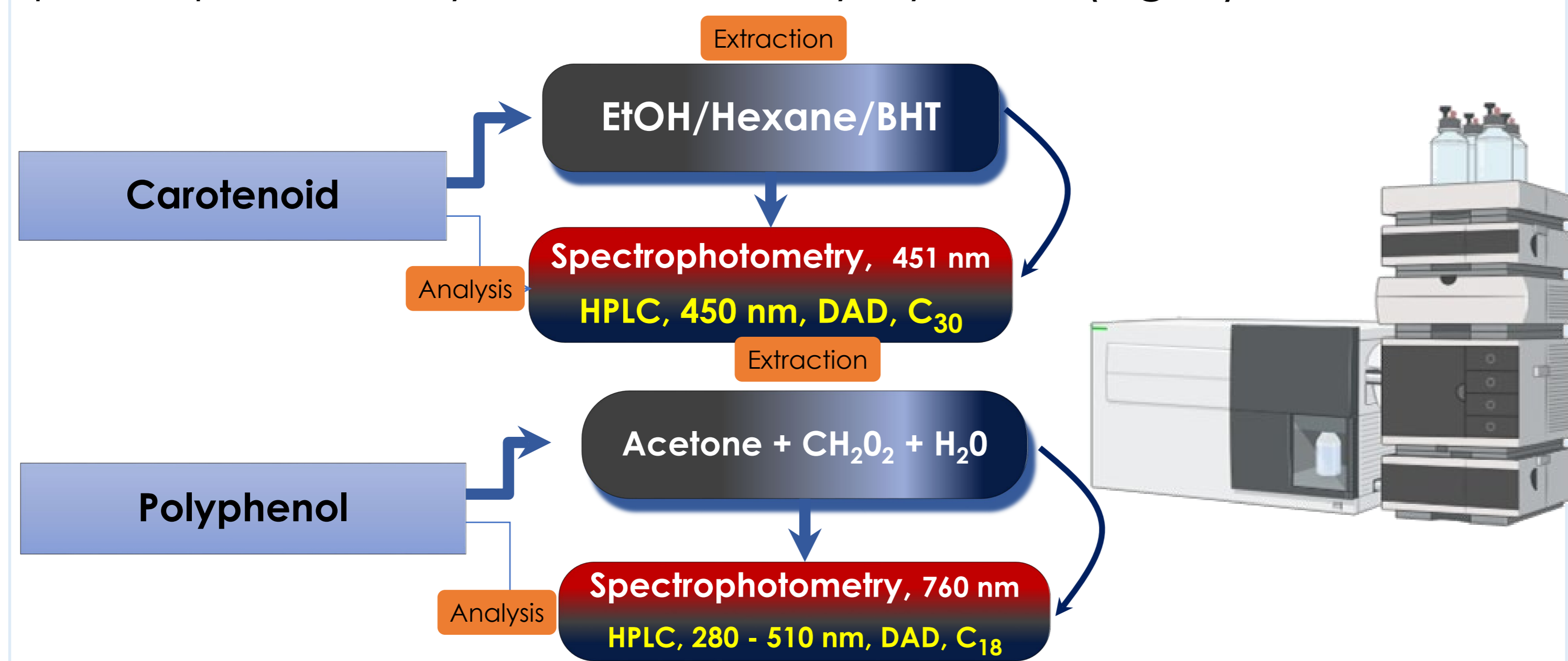


Fig 2. Analyses of carotenoids and phenolics

*ICP-AES: Inductively coupled plasma atomic emission spectrometer

Results

The results presented are from Malanje (AbM); Huambo (AbHb); Huíla (AbHa) and a fruit mixture (Ab), expressed in dry matter (table 1).

Table 1. Results of the physicochemical analysis of *Anisophyllea boehmii* from 3 areas harvested and one uncertain

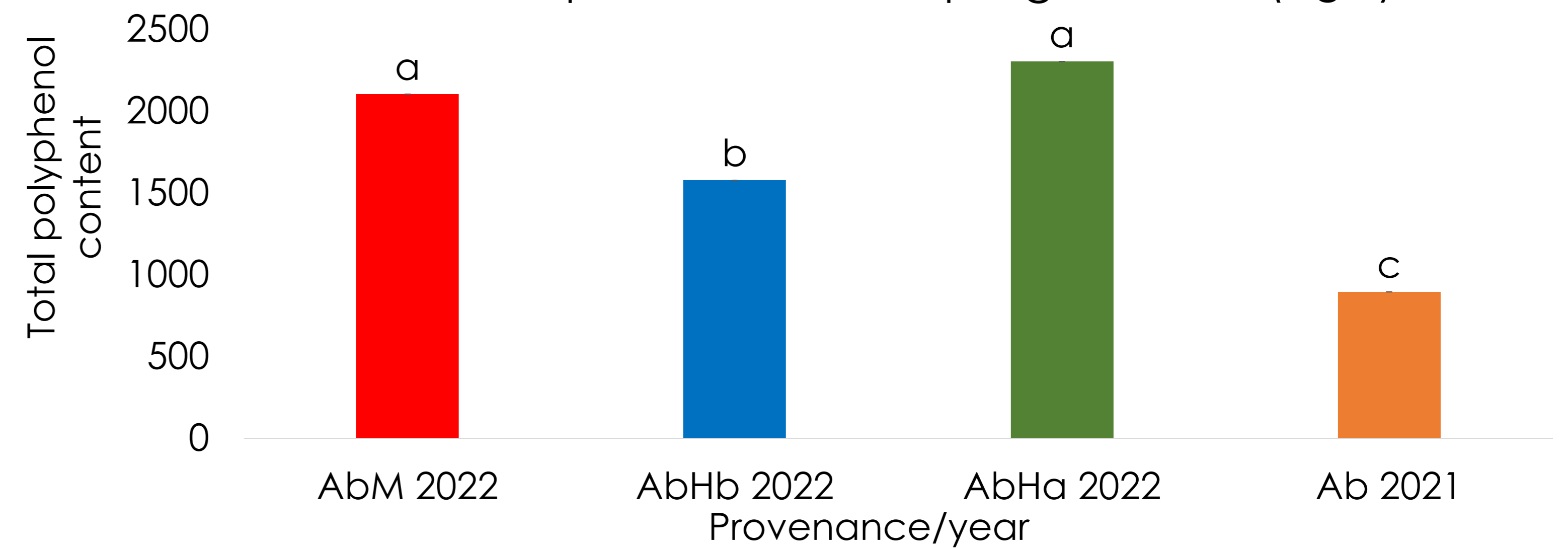
Components	Production area			
	AbM/2022	AbHb/2022	AbHa/2022	Ab/2021
Dry matter (g.100 g ⁻¹)	21.89 (0.15) c	22.73 (0.21) b	20.24 (0.19) d	24.71 (0.51) a
TSS (g.100 g ⁻¹ of FM)	17.91 (0.38) b	18.05 (0.54) b	16.29 (0.24) c	19.80 (0.40) a
pH	3.14 (0.07) bc	3.11 (0.03) c	3.24 (0.02) ab	3.27 (0.05) a
TA (E.g Ac. Cit/100 g ⁻¹ of DM)	9.06 (0.05) b	8.10 (0.28) c	10.35 (0.16) a	10.60 (0.34) a
Total Ashes (g.100 g ⁻¹)	4.37 (0.03) c	4.27 (0.07) c	5.17 (0.07) b	5.51 (0.12) a
P (g.100 g ⁻¹ of DM)	0.09 (0.00) c	0.10 (0.00) b	0.09 (0.00) c	0.11 (0.00) a
K (g.100 g ⁻¹ of DM)	1.04 (0.00) b	1.01 (0.00) c	1.25 (0.00) a	1.25 (0.01) a
Fe (mg.kg ⁻¹ of DM)	30.03 (1.56) a	30.73 (3.49) a	25.29 (1.77) a	29.82 (1.67) a
Mn (mg.kg ⁻¹ of DM)	133.63 (0.52) b	113.74 (2.95) c	202.73 (0.50) a	202.47 (0.76) a

Values with the same letter on the same line are not significantly different (p < 0.05). Mean and standard deviation with n = 3.

There was no significant difference between the samples, for dry matter, TSS and TA (high levels). However, potassium content was lower for AbHb and pH was higher for Ab samples.

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The content of phenolics was the highest for AbHa, followed by AbM fruits. Phenolic content was more dependent on sampling location (Fig 3).

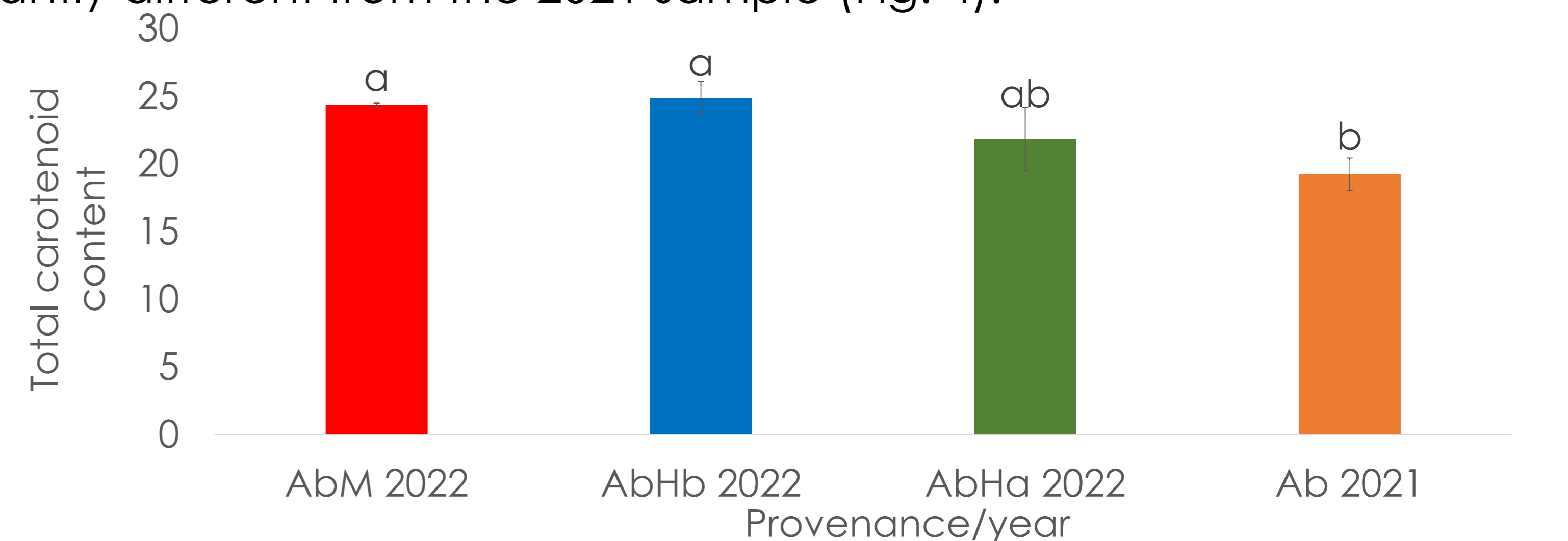


Different letters for significant difference Tukey test p<0.05

Fig 3. Total phenolic composition of fruits from the 3 identified zones and one uncertain (mg EAG/100g DM)

Two classes of phenolics were found, the anthocyanins: cyanidin 3-O-glucoside and the flavonols: quercetin O-glucoside, myricetin rutinoside and rutin (3-O isomer).

The results for total carotenoids showed that there was no difference between the 2022 samples. Furthermore, the 2022 AbHa sample was not significantly different from the 2021 sample (Fig. 4).



Different letters for significant difference Tukey test p<0.05

Fig 4. Total carotenoid content (mg Eβ-Carot/100g DM)

This fruit is rich in carotenoids from the xanthophyll group, which are esterified, and also contains β-carotene, which has a provitamin A effect (Fig 5 and Table 2).

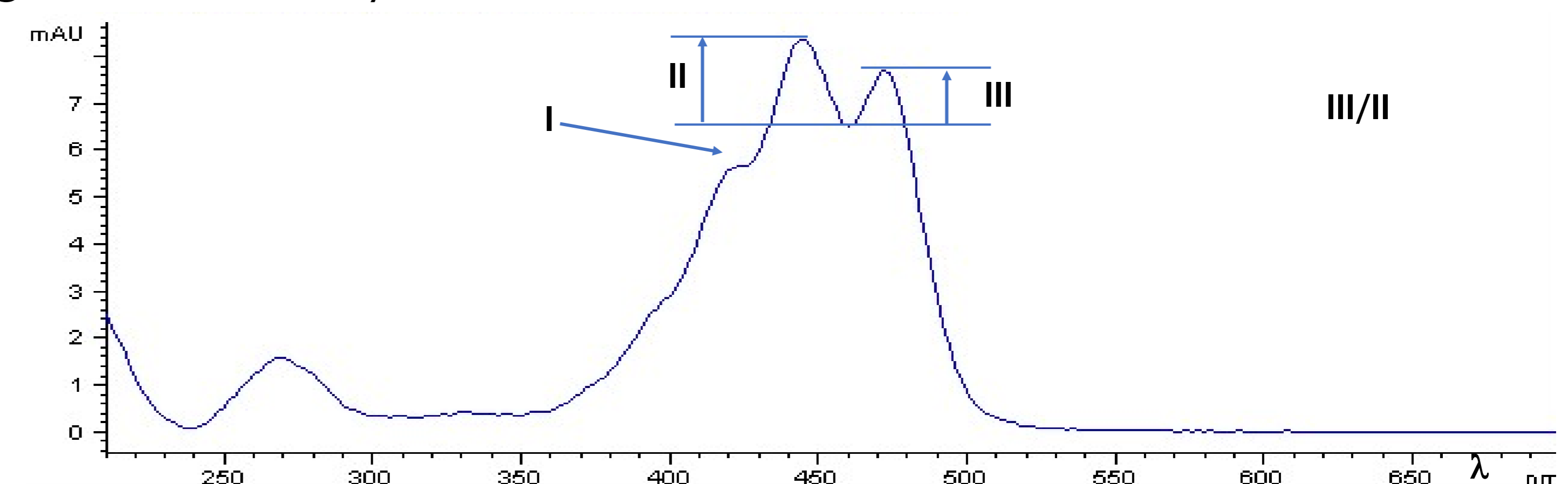


Fig 5. Spectral characteristic of Antheraxanthin

Table 2. Identification and spectral characteristics of carotenoid compounds

Peak	Identification	λ max (nm)	% III/II
1	Antheraxanthin	(422) ; 444 ; 472	58
2	Zeaxanthin	(426) ; 451 ; 476	23
3	β-Cryptoxanthin	(424) ; 452 ; 476	18
4	Lutein	(424) ; 446 ; 473	52
5	β-Carotene	(424) ; 452. 476	15

Conclusion

This fruit is much appreciated in Angola; high nutritional potential; little variability in its composition; rich in bioactive compounds such as carotenoids and polyphenols with antioxidant action and also protective action in some parts of the plant.

Main references

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