ANALYSIS OF BIOACTIVE COMPOUNDS

Proximal analysis of raw grape pomace, vitreous biomaterial and ultrafine powder

A comparative analysis was performed on the proximate composition of the 3 samples from grape pomace, raw grape pomace, vitreous biomaterial and ultrafine powder, using the certified methods based on AOAC (Official Methods of Analysis for Nutrition Labeling).

Table 1 shows the results of the chemical analysis of the three vegetal matrices in their different forms.

	Results for 100 g of sample		
	Grape Pomace	Cylindroform biomaterial	Micronized powders
Moisture /g	11,27	6,60	4,29
Total protein /g	11,50	10,80	11,50
Total fat /g	4,71	8,75	11,49
Ashes /g	8,81	6,88	6,85
Raw fiber /g	19,77	21,79	19,99
Non-nitrogenous extract /g	43,94	45,18	46,18
Calories /kcal	264,15	302,67	331,43

Table 1

From these assays, it can be seen that the ultrafine powder contains significant amounts of protein and crude fiber, making it an excellent dietary supplement. Figure 1 shows the

comparative graph of the results obtained from the proximate analysis of grape pomace, vitreous biomaterial and ultrafine powder.

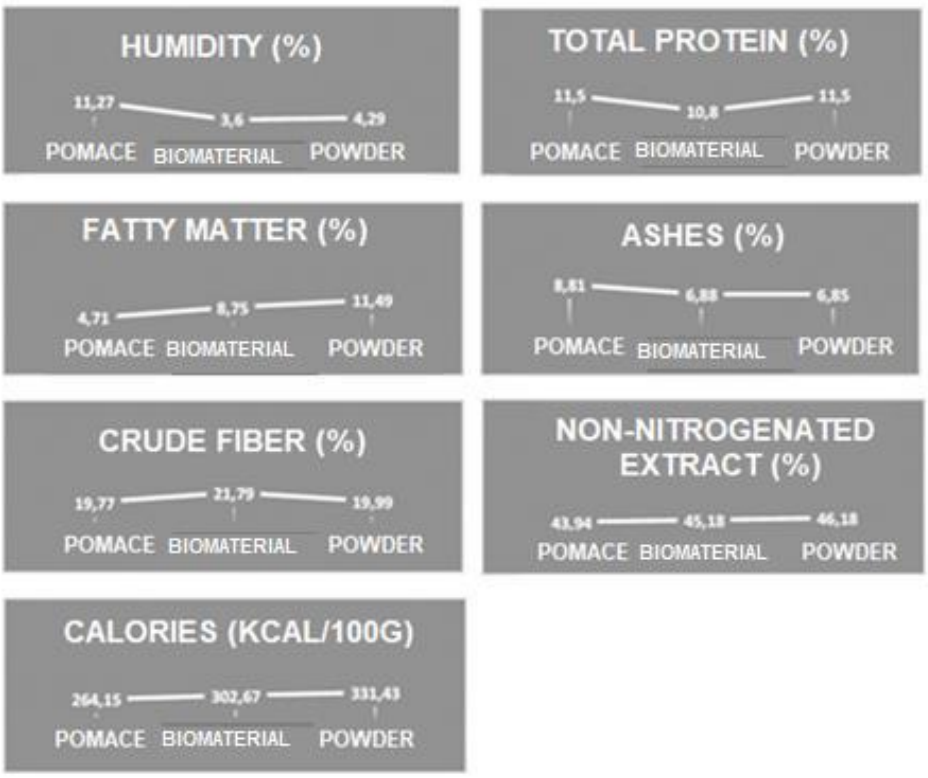

Figure 1

Determination of total polyphenols and antioxidants

A comparative analysis was carried out on the concentration of total polyphenols and antioxidant activity (ORAC) of the 3 samples, raw grape pomace, vitreous biomaterial and ultrafine powder resulting from the particle size reduction process of the biomaterial (ultrafine ingredient).

A technique based on the method of Wu et al. (J. Agric. Food Chem. 52: 4026-4037; 2004) was used to measure the amount of total polyphenols present.

To determine the levels of antioxidants in a food, the ORAC (Oxygen Radical Absorbance Capacity) technique is used.

The results are shown in Table 2.

Table 2

	Results for 100 g of sample		
	Grape Pomace	Cylindroform biomaterial	Micronized powders
Total Polyphenols/mg GAE (*)	1.015,7 ± 2,6	2.693,2 ± 4,2	3.925,8 ± 5,6
ORAC / µmol TE (**)	15.235,8 ± 10,6	26.128,7 ± 15,6	38.990,5 ± 18,6

(*) GAE = Gallic Acid Equivalents / (**) TE = Trolox Equivalents

When comparing the amounts of antioxidant compounds and polyphenols in the three types of sample, a significant increase in their concentration is observed. This shows that the process of obtaining the vitreous biomaterial modifies the basic cellular structure of the pomace, generating an alteration that allows a better crushability of this biomaterial, thus breaking the polymerized macromolecules present in the cell wall, membranes and other subcellular components, which increases the bioavailability of the smaller structures, such as the polyphenol storage granules. These results are consistent with what was observed in physiological analyses through SEM imaging. Furthermore, the additional particle size reduction process of the vitreous biomaterial further increases access to these biocompounds.

The comparative values of total polyphenol concentration and antioxidant activity (ORAC) between raw grape pomace, vitreous biomaterial and ultrafine powder are presented in the graphs in Figures 2 and 3 respectively.

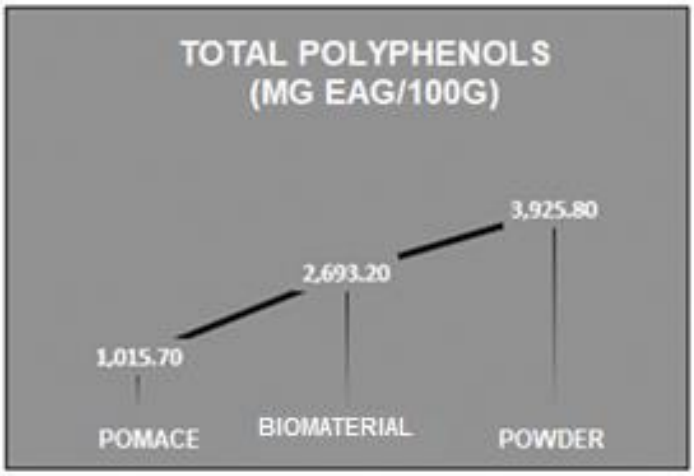

Figure 2

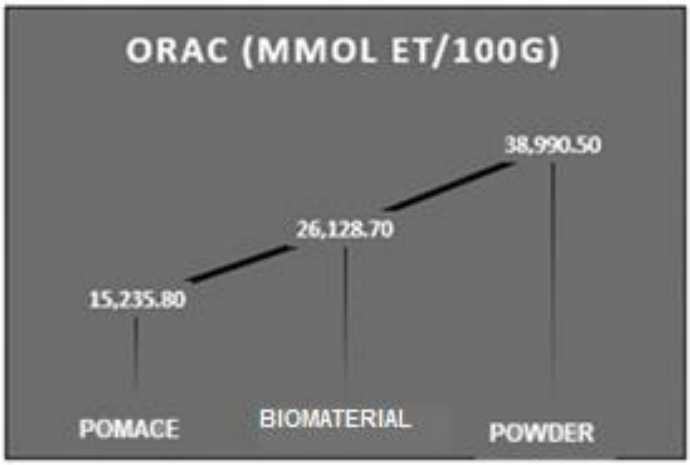

Figure 3

The increase in total polyphenol content between raw grape pomace and ultrafine powder corresponds to 387% (Figure 2), while the increase in antioxidant capacity corresponds to 256% (Figure 3).

The multiplicative effect of these parameters, generated when going from one type of material such as grape pomace to another such as the ultrafine ingredient, is due to the fact that when the particle size of a substance is reduced, changes occur in its surface and structure, which affects the release and availability of the secondary metabolites present in the substance, in this case the increase in total polyphenol content. The increase in ORAC is a reflection of the increase in polyphenols and other antioxidants present.