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Research Paper

Comparative Analyses of Olive Mill Solid Residues in Northwestern and Southwestern Region of Libya

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Abstract This study carried out to estimate the crude protein, total lipid, crude ash and moisture content of olive pomace. The olive pomace samples were collected from Gharyan and Samno during the harvesting season 2020. Crude protein was determined by standard Kjeldahl method and the total lipid was estimated by Soxhlet extraction method. The results show that Gharyan olive pomace had the highest amount of protein (P≤ 0.05) compared to that collected from Samno with statistically significant difference suggesting that the composition of matrices and their percentage may be responsible for composition of amendments. The calculated total protein percentage was (3.81 ± 0.08 %) for Gharyan and (2.51% ± 0.03) for Samno olive pomace. Gharyan olive pomace shows the highest amount of total lipid (P≤ 0.05) compared to that collected from Samno. The percentage of total lipid of the olive pomace samples were 12.7% ± 0.31 and 11.4 ± 0.22 % for Gharyan and Samno respectively. The percentage of crude ash content of the olive pomace samples were 12.9% ± 0.21 and 12.8 ± 0.23 % for Gharyan and Samno respectively but the differences in the values in study samples were not substantial. The percentage of moisture content of the olive pomace samples were 41.28% ± 2.11 and 34.05 ± 1.21 % for Gharyan and Samno respectively. In conclusion, olive pomace by-product could give a sustainable and alternative-cheap source for fertilizers, food industries, pharmaceutical industries, cosmetics and other industries .

Keywords: olive pomace oil; total protein content; olive pomace; Gharyan; Samno.

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INTRODUCTION

Olive oil cultivation is a considerable feature of land-cover in Mediterranean regions (Hanene et al., 2015), covering more than five million ha in the European Member States (Gómez-Muñoz et al., 2012). The majority of the world's production of olive oil, 2918000 tons in 2017 (International Olive Council, 2017), is based in the the Southern European countries, the North Africa and Near East, where olive (Olea europaea L.) farming is a centuries-old tradition, specifically for oil extraction (Alburquerque et al., 2004). Although, a lot of other countries such as Australia and South Africa are emerging as producers while they are encouraging intensive olive tree farming (Roig et al., 2006).

Olive pomace, a solid by-product of olive oil extraction composed of a composition of woody endocarps, seeds, skins, pulp and which represents nearly 35 % of the weight of olives pressed (Dal Bosco et al., 2007) is obtainable locally in large quantities. Olive pomace, also called, olive cake or olive husk is one of the most abundant agro-industrial by-products in the Mediterranean countries (Neifar et al., 2013).

As reported by International Olive Council (2017), the olive pomace consists of the lignocellulosic matrix (cellulose, hemicelluloses and lignin) with phenolic compounds, uronic acids, and oily residues (Pagnanelli et al, 2010; Yücel, 2012). The amount and physicochemical properties of olive pomace (olive cake) produced will depend on the method used for the oil extraction. In reality, there are two ways of extracting the oil: traditional pressing, used for many centuries with only slight modifications and centrifugation (two and three-phase system) one, that the olive oil industry has taken over in the last decades (Roig et al., 2006). The management of these huge quantities of olive pomace involves a problem for these industries because of their potential as pollutants in some cases and to the costs associated to the treatments needed for their proper removal (Pagnanelli et al, 2010; Michailides et al., 2011; Notarnicola et al., 2015). In general, plant by-products has been interested by the utilize of their components and for the reduce of environmental problems associated with by-product degradation. Conversely, olive pomace is preferred due to its high amount produced and low price, could be a cheap source of nutritional stuff or proteins for use in the food industry.

This study aimed to determine the chemical composition of the olive pomace collected from northwestern and southwestern region of Libya.

2. MATERIALS AND METHODS

Sample collection

All samples (18 samples) of olive pomace were obtained from Gharyan city in the region of the northwestern and from Samno village in the region of the southwestern region of Libya (Fezzan), between November and December harvest season 2020. Nine samples from each sampling site (Figure 1), the pomace was collected in a closed plastic container, and all samples were immediately maintained at 4°C so prevent biodegradation

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Figure 1: Sampling site

Chemical Analyses

The proximate composition the olive pomace were carried out in accordance with the Association of Official Analytical Chemists (AOAC, 2000) methods. Moisture content, crude ash, crude protein (N x 6.25) and total lipid were measured.

3. RESULTS AND DISCUSSION

Results showed the percentage of protein content of the olive pomace that collected from two locations was 2.51% ± 0.03 and 3.81 ± 0.08 % for Samno and Gharyan respectively. Gharyan sample shows the highest amount of protein (P≤ 0.05) compared to that collected from Samno (Figure 2).

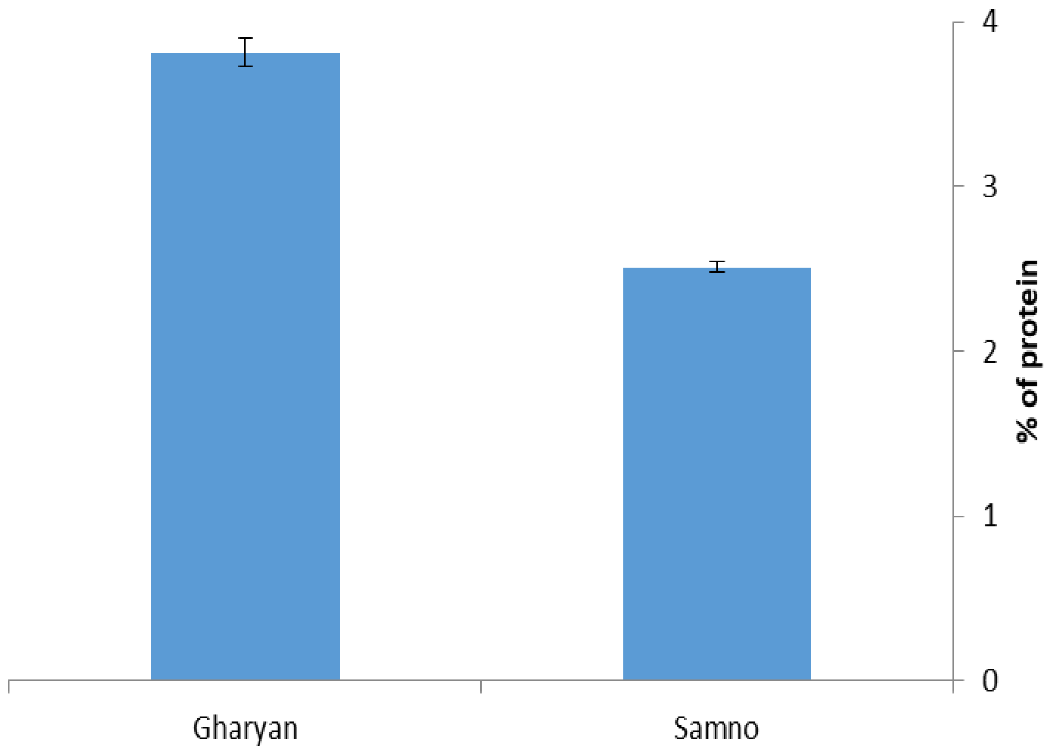

Figure 2: The percentage of protein content of the olive pomace

In this study, the percentage of protein was measured according to Kjeldahl method and results indicated that Gharyan olive pomace contained high amounts of protein compared to Samno olive pomace, with a value 3.81 ± 0.08 %, these findings were similar to the previous studies. As mentioned before (Figure 2), the protein content measurement were quiet different, suggesting that the composition of environments and their percentage may be responsible for the nutrients composition of modifications (Wedyan, et. al., 2017). Interaction between protein and lignocellulos fraction represented by the fiber, may be responsible for the low amount and the significant difference between samples that collected may reflect the effect of change of temperature range between different seasons. Also, the processes of extraction may have an effect on the protein percentage duo to the biological processes during extraction, but not the extraction process itself [Diacono, et. al., 2012].

As shown in Figure 3, the percentage of total lipid of the olive pomace samples were 12.7% ± 0.31 and 11.4 ± 0.22 % for Gharyan and Samno respectively. Gharyan olive pomace shows the highest amount of total lipid (P≤ 0.05) compared to that collected from Samno (Figure 3).

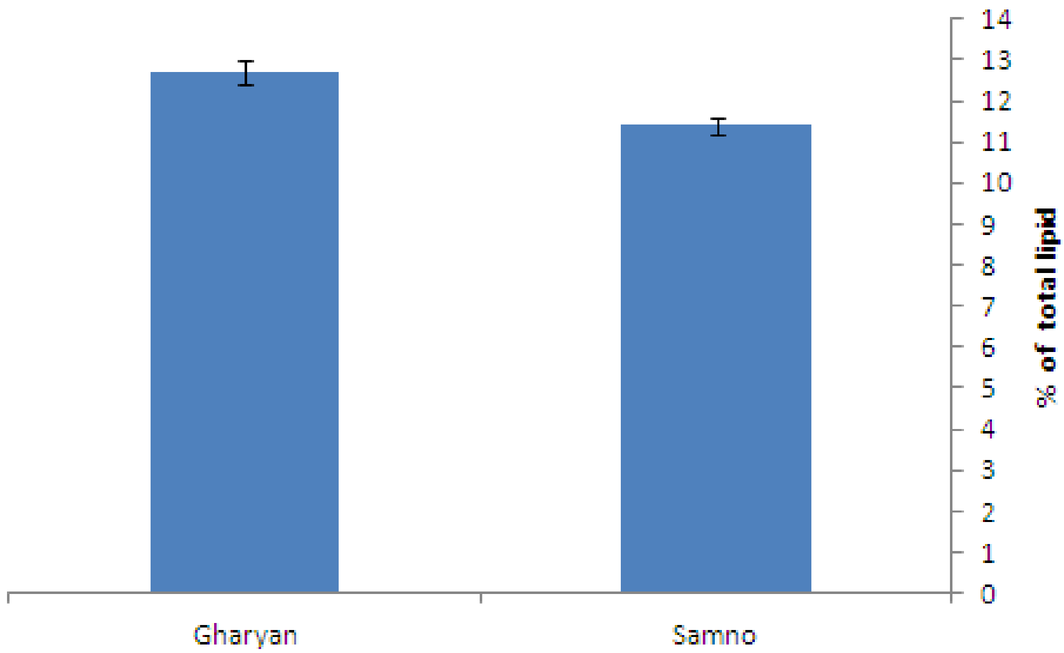

Figure 3: The percentage of total lipid of the olive pomace

Differences in the values for crude ash in study samples were not substantial (Figure 4). The percentage of crude ash content of the olive pomace samples were 12.9% ± 0.21 and 12.8 ± 0.23 % for Gharyan and Samno respectively. The high amount of ash suggests a high-value mineral.

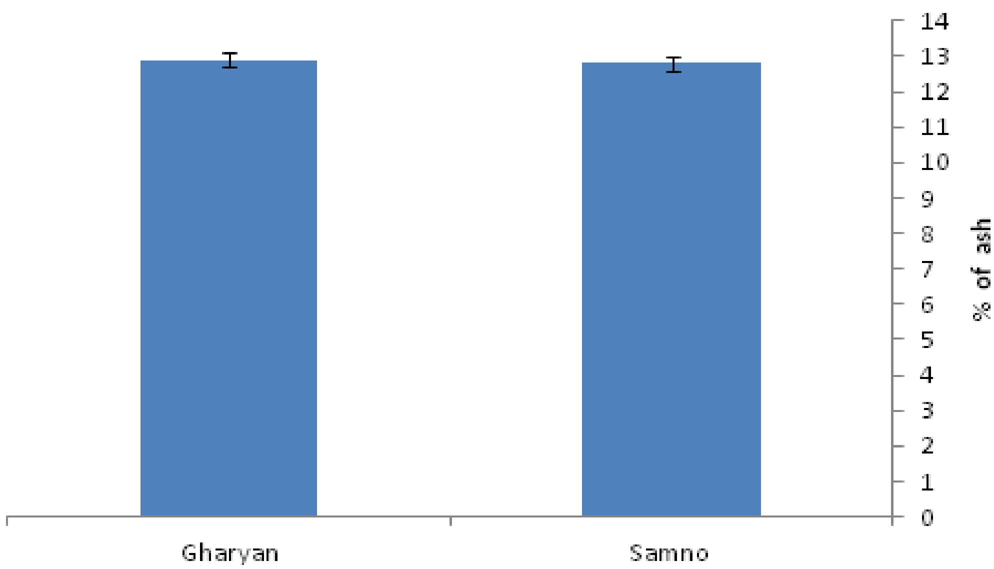

Figure 4: The percentage of crude ash of the olive pomace

Gharyan olive pomace had higher moisture content (Figure 5). The percentage of moisture content of the olive pomace samples were 41.28% ± 2.11 and 34.05 ± 1.21% for Gharyan and Samno respectively.

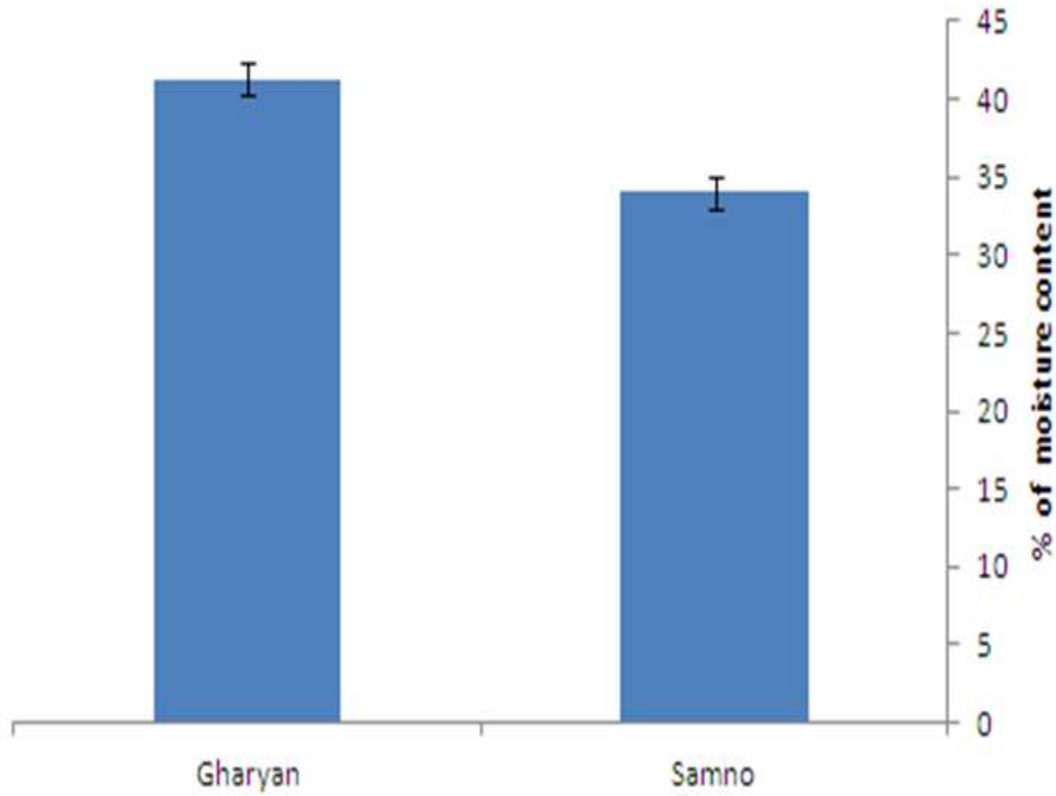

Figure 5: The percentage of moisture content of the olive pomace

The difference in the composition in the olive pomace is due to the difference in the olive pressing methods and the processing conditions (Sánchez-Martín & Rayón-Durán, 2013), which means the difference in the efficiency of olive pressing.

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