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EVALUATION OF BY-PRODUCTS THAT CAUSE ENVIRONMENTAL PROBLEMS IN OLIVE OIL PRODUCTION

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In olive production, which has a very important place in the country's economy, in addition to main products such as olive oil and table olives and olive oil, solid and liquid by-products such as "Pirina" and "Blackwater" are formed in olive oil factories. Against pomace, which can be evaluated economically, black water is left indiscriminately to the environment. Most of the wastes that occur on average as 200 billion tons each year are either left to nature as garbage or used as fuel, animal feed or fertilizer with a little processing. Environmental pollution that appears with increasing industrialization and population, and the economic consumption used to eliminate pollution cause wastes to become a biomass problem.

Keywords: olive, processing, olive by-products, waste, blackwater, prina (pomace).

It is obtained by mechanical means from the fruits of the evergreen tree *Olea europaea*. The food industry has a wide working area and high production capacity in terms of raw material sources used. As a result of production, high amounts and various types of waste are generated. Creating a waste awareness for this sector will also contribute to our country economically. Waste biomass, which can be considered as a renewable energy source, has become an increasingly important field of scientific study and industrial application in terms of environmental and economic reasons, as well as the recovery of waste, useful, cheap, new, high value-added and natural products. Olive black water; contains sugars, organic acids, polyalcohols, pectins, colloids, tannins and lipids. Valuable products can be produced by biotechnological transformation from solid and liquid wastes from the olive oil industry. In order to determine the wastes of the olive and olive oil processing industry and alternative evaluation methods, first of all, olive, olive oil and its compositions should be examined, and then the wastes generated in the production technology should be investigated in detail.

a. Fleshy part (Mesocarp): It makes up 65–83 % of the grain. It contains water, oil, sugar, polysaccharides, protein, pectin, organic acid, tannin, oleuropein, color and mineral substances. The fleshy part contains 50–60 % water, 15–30 % oil, 2–5 % nitrogenous substances, 3–7.5 % sugar, 3–6 % cellulose, 1–2 % minerals, 2–2.25 % phenols.

b. Seed: In this part of the grain, there are 30 % water, 27.3 % oil, 10.2% nitrogenous substances, 26.9 % sugar, 1.9 % cellulose, 1.5 % minerals, 0.5 % polyphenols.

c. Core (Endocarp): It makes up 13–30 % of the grain. The kernel consists of the kernel shell and the seed inside. In the core part, there are 9.3 % water, 0.7 % oil, 3.4 % nitrogenous substances, 41 % sugar, 38 % cellulose, 4.1 % minerals, 0.1 % polyphenols.

In the composition of the olive fruit, besides phosphorus, potassium, calcium and magnesium elements, there are vitamins A (retinol), which plays an important role in vision, E (tocopherol), which is one of the natural antioxidants, K (naphthaquinone), which is a coagulation factor, and D (cholecalciferol), which prevents rickets.

Alternative Uses of Wastes from Olive Oil Production. When we classify the studies carried out to evaluate the waste products generated in olive oil production in the world, according to their fields; alternative energy production (biodiesel, biogas, bioethanol, biohydrogen, pellet), livestock (feed) and agricultural applications (soil conditioner), food (gelling, functional foods), pharmaceuticals, nutraceuticals, cosmetics (preservatives, natural humectants) applications, and we encounter biotechnological applications such as bioplastic/biopolymer, biological surfactant and lipase production.

Phenolic substances (1–3 % by weight) are at the top of the bioactive substances in olives. More than 36 phenolic compounds have been identified in olive oil. The antimicrobial, antioxidant and anti-inflammatory effects of olive oil phenolic compounds have been demonstrated in many studies.

The use of olive black water in animal nutrition. At the end of olive oil production, a serious level of olive waste water (black water) is formed. It can be used in blackwater animals by concentrating or drying.

The use of pomace in animal feeding. Factors such as the method used in olive oil production, the geographical condition of the region where the olives are obtained, the harvest period and the separation of the seed from the olive pomace affect the chemical composition of the olive pomace. These situations affect its use in animal nutrition. In order to produce animal feed additives from raw pomace, the very high acidity of the pomace

must be adjusted and its oil must be removed. The main reason why it is preferred as animal feed is that it is cheap. However, the biggest disadvantage is that it is poor in protein and contains a high amount of cellulose.

Use of pomace for fertilization purposes. The most important benefit of this method is to bring the high amount of nutritive components carried by the waste to the soil naturally. Raw pomace (50 % moisture) contains nitrogen (0.96 %), phosphorus (0.56 %) and total organic carbon (60.45 %). These components are added to the soil with the humus-like product obtained from the enrichment of pomace by fermentation in an airless environment.

Use of olive black water for fertilization. When olive oil waste water is used directly as organic fertilizer, it has negative effects on plants and soil properties. Treatment of these wastes is necessary to produce a stable and easily manageable end product. Composting is a widely used treatment for the treatment of organic waste. To dispose of olive oil waste water, composting olive oil waste water is an economically and ecologically accepted method. In this way, black water can be used as organic fertilizer without any phytotoxic effect.

The use of pomace in the production of phenolic compounds. Pomace; It is very rich in oleuropein, hydroxytyrosol, tyrosol, phenolic acid and flavonoid content. Approximately 0.27–0.29 g of polyphenols (oleuropein, hydroxytyrosol, tyrosol and tocopherol) and flavonoids (apigenin, quercetin, luteolin etc.) 70.0–79.3 g of cellulose; 3.54–4.75 g of ash; There are 107,1–195.4 mg of polyalcohol (mannitol). It is also very important that it is a natural and cheap resource.

Production of pectin and polyphenol from black water and olive pomace. The oil and water contained in the waste are separated by the pre-treatments carried out by centrifugation and evaporation.

Production of tyrosol and hydroxytyrosol from Blackwater. Microfiltration (MF), ultrafiltration (UF), nanofiltration (NF) in addition to column chromatography for the production of tyrosol and hydroxytyrosol from black water in a 2009 patented study for use in dermocosmetic products (milk, gel, cream), nutraceuticals and beverage-based diet mixtures. Purification was made with reverse osmosis (RO) membrane systems, and water was recycled by spray drying.

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