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OIL EXTRACTION AND FATTY ACID CHARACTERIZATION OF SWEET PEPPERS SEEDS *CAPSICUM ANNUM* (L.) BY GAS CHROMATOGRAPHY-MASS SPECTROMETRY(GC-MS) AND ITS USE IN BEEF BURGER PATTIES PRESERVATION

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ABSTRACT

The present study was conducted to estimate the physicochemical characteristics, fatty acids, phenolic compositions and antioxidant activity of the extracted sweet pepper seed oil (SPSO) using the Gas Chromatography-Mass Spectrometry (GC-MS) technique. The obtained oil yield was 14.7%. Outcomes of the extracted oil revealed the following physical and chemical properties: Iodine number 141.64 mg/100g, saponification number 197.51 mg KOH/g, peroxide number 3.63 meq/ Kg oil, free fatty acid 0.48, refractive index 1.467, specific gravity 0.924 g/cm^3 and viscosity 63.24 cp. Applying GC-MS technique, cis-Palmitoleic acid was the predominating fatty acid, followed by Myristic acid and Pentadecylic acid while Heptanoic acid was the lowest one. Additionally, esters of some fatty acids and bioactive chemical compounds such as Phenol, 2,2'- methylene bis [6-(1,1-di methyl ethyl)-4-methyl] were determined. The antioxidant activity of SPSO at different concentrations 0.625, 1.25, and 2.50 % was estimated during the cold storage of beef burgerpatties at 4°C, and results revealed that the highest inhibition of 2,2-Diphenyl-1-picrylhydrazyl (DPPH) root was 74% at a concentration of 20 mg/ml. Whereas, a significant decrease ($p \leq 0.05$) in the peroxide value 12.27 mEq/ Kg was observed at 2.5 % SPSO,presenting the highest antioxidant activity through inhibiting the peroxide formation in burger samples by the end of the tenth day of storage at 4C°. In conclusion, SPSO is suggested as a powerful natural food preservative for application in the food industry. because of its bioactive antioxidant components.

Keywords: Sweet pepper seed oil, (SPSO), Fatty acid, Antioxidants, Beef burger patty, Capsicum

INTRODUCTION

Pepper is a crop in the eggplant family that has spread to many countries around the world. Sweet pepper is widely grown in Asia, North America, Africa, and countries of the Mediterranean basin **(Jeong *et al.*, 2011)**. The Agro-food industry generates massive amounts of liquid and solid waste as a result of the food transformation and consumption chain. Pepper seed is a byproduct of the pepper processing industry. Every year, large amounts of pepper seeds are produced, and these byproducts are typically discarded as solid waste **(Li *et al.*, 2018).**This caused a major problem and aggravated the industry's burden on waste treatment, because it is expensive to transport, handle and dispose this waste **(Silva *et al.*, 2013)**.These solid waste pepper seed resources have yet to be fully utilized. Nonetheless, pepper seeds, like pepper fruits, are a promising source of nutritional constituents and bioactive compounds such as capsaicinoids and phenolics that can be used for their biological potential **(Sung *et al.*, 2015)**. Capsicum spp.is a remarkable source of several antioxidant compounds, including capsaicinoids **(Topuz and Ozdemir, 2007**).

Even though, lipids and fatty acids constitute a minor constitute of the edible portion of peppers, they play an important metabolic and structural role **(Martínez *et al.*, 2006)**. Lipid content is an important quality parameter asseveral bioactive molecules responsible for pericarp (pulp) color are liposoluble. Furthermore, the nutritional quality of lipids is determined by their fatty acid composition **(Zaki *et al.*, 2013).**

The toxic and carcinogenic impacts of synthetic antioxidants have recently increased demand for natural antioxidants. Since it contains so many antioxidants compounds, *Capsicum annuum L*. is well-known natural antioxidant. Fresh sweet peppers have exceptionally high ascorbic acid, a 100 g serving to supply100% of the current Dietary Reference Intake (DRI) of 60 mg/day as well as moderate to high levels of neutral phenolics or flavonoids, namely quercetin, luteolin and capsaicinoids **(Deepa *et al.*, 2006).** Given the annual increase in sweet pepper production, the new application of using seed waste as an antioxidant material is away to fill this gap and maximize this resource use **(Sim and Sil, 2008).**

Hence, the current study was conducted to investigate the yield of seed oil extracted from *Capsicumannuum L*.and its fatty acid compositionas well as the physicochemical properties. Additionally, the antioxidant activitywas assessedusing radical scavenging (DPPH)antioxidant assay coupled with an experimental trial on the processed meat (beef burger patties) model.

MATERIALS AND METHODS

Sweet Pepperseeds

Sweet pepper seeds were purchased from Basrah, IRAQ. The seeds were thoroughly cleaned, rinsed, and dried for three days at 30 °C until became completely dry. The dried capsicum seeds were separately ground in a coffee grinder for one minute to assess the proximate composition and seed oil characteristics, and then stored at -18 °C for further analysis. All reagents used in this study were of analytical grade and obtained from Sigma-Aldrich (USA).

Chemical composition of Sweet Pepperseeds

Determination of the physicochemical properties of Sweet Pepperseeds including the moisture content, protein, fat and ash contents wasdone according to the official methods**(AOAC, 2000)** 925.09, 2001.1, 932.06, and 985.29 receptively.

Oil extraction

Lipids were extracted from the seeds as described before by **(Bligh and Dyer, 1959**). Briefly, five grams of ground pepper seeds were placed in an Erlenmeyer flask then a mixture of 25 ml chloroform, 50 ml methanol, and 20 ml of deionized water (1:2:0.8, v/v/v)were poured into seeds powder. The mixture was then shaken for 10 min. Following the completion of the lipid extraction, the mixture was promptly filtered through cheesecloth to eliminate any remaining seeds and prevent further lipid extraction. The mixture was moved to a glass separating funnel to allow the organic and aqueous layers to be separated, and then the rotary evaporator was used to evaporate the chloroform layer, leaving behind the extracted lipids. The extracted lipids' weight was then measured.