PRODUCTION OF SOME NANO INGREDIANTS FROM FOOD PROCESSING WASTES AND THEIR APPLICATIONS IN FOOD

By

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B.Sc. Agric. (Food Science Department), Ain Shams University,2010

A Thesis Submitted in Partial Fulfillment

of

The Requirement for the Master Degree

in

Environmental Science

Department of Environmental Agricultural Science

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ABSTRACT

Food plant wastes accumalated millions of tons per year and cause environmental problems. This study aim to utilize the food plant wastes (i.e. orange juice and red grape wine wastes) in production of bioactive ingredient in nano form to be supplement in food and reduce the environmental pollution.

The data showed that the amount of total phenolic compounds were 4.35 and 6.6 mgGAEs.mg-1in orange peels and nano polyphenols extract respectively. While for total anthocyanins content were 0.118 g /g DM and 40 mg/L in grape peels and nano anthocyanins extract respectively. Results also showed that the most active sample of Nano polyphenols and Nano anthocyanin for antioxidant activity by reducing power were 1.995 , 2.805 at 40 µg /ml concentration respectively. While for DPPH scavenging ability for both nano polyphenols and nano anthocyanin were 50.456, 55 % at 40 µg /ml concentration respectively. It is very important to point out that there is a positive correlation between antioxidant activity and amount of phenolic compounds of these extracts. Then, after the addition of nano polyphenol compounds at different concentrations in pineapple jelly product and antioxidant activity by DPPH and sensory characteristics of the product have been evaluated. While the nano anthocyanins compounds have been used as food naturally colorant a in the production of jelly and the sensory characteristics of the product have been also evaluated.

Keywords :- Polyphenols – Anthocyanins – Encapsulation – Antioxidant activity – Nanotechnolog - Produce jelly – Toxicity.

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LIST OF ABBREVIATIONS

Nm	**Nano meter**
TPP	**Total polyphenols**
TA	**Total anthocyanins**
TEM	**Transmission Electron Microscopy**
PPM	**Part per million**
DF	**Dilution factor**
DPPH	**1,1-diphenyl-2-picrylhydrazyl**
GAEs.	**Gallic acid equivalents**
BHT	**Butylated hydroxytoluene**
SFE	**Supercritical Fluid Extraction**
MglcE	**Malvidin-3-glucoside equivalents**
BHA	**butylated hydroxy anisole**

1. INTRODUCTION

More than million tons of food plant wastes are accumulated every year causing many environmental problems. In Egypt and in many Mediterranean countries, major quantities of the peels are not further processed. Plants which contain high level of polyphenol and flavonoids have a great importance as natural antioxidants **(Abd El-Al and Halaweish, 2010).** Polyphenolic compounds are usually referred to as a diverse group of naturally occurring compounds containing multiple phenolic functionalities. They have synthetic medicinal and industrial value. From a chemical point of view, polyphenols have powerful antioxidant activity which can react with one-electron oxidants, prevents free radical formation in biological systems **(Handique and Baruah, 2002)**. Grape by-products, for instance, constituted mainly by peels, contain a high amount of secondary metabolites including phenolic acids, flavanols and anthocyanin which are reported to possess antibacterial, antiviral, antioxidant, anti-inflammatory, anti-cancerogenic and prevent diseases **(Corrales *et al.* 2008)**.The interest with anthocyanins, which belong to the flavonoid phenol compounds, has increased because of their possible health benefits. The stability of the anthocyanin pigments is influenced by environmental and processing factors such as pH value, temperature, presence of oxygen, enzymes, condensation reactions **(Vatai *et al.* 2008 and Oancea *et al.* 2012).** Therefore, natural antioxidants and colorants present in foods have attracted interest because of their safety and potential nutritional and therapeutic effects **(Duymus *et al.*2014).**.

Extraction of these bioactive compounds with conventional method (solvent solution) cause high energy costs; elevated solvent use; high temperatures, injurious for thermo labile substances and reducing the product quality. These natural compounds can also be alternatives to synthetic dyes. Alternatively, supercritical fluid extraction (SFE) is considered a new