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EXTRACTION OF ANTIOXIDANT FROM GUAVA LEAVES

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Abstract

The free radical generation will be stopped by the antioxidants in a variety of ways. In this study, we have observed several methods used to extract the natural antioxidant from Guava Leaf which are Enzyme-assisted extraction, Alcohol extraction, Non-alcohol extraction and Soxhlet extraction method. The types of enzyme treatment used in Enzyme-assisted extraction were cellulase-assisted extraction (CAE), β-glucosidase assisted extraction (GAE), complex enzyme-assisted extraction (CEAE). Second, the types of alcohol solvent used in extracting antioxidant compounds from guava leaves are ethanol, methanol and butanol with different concentrations of each alcohol. Third, the types of non-alcohol solvents used in the non-alcohol extraction were water, acetone and chloroform. Fourth, the list of extraction methods used were Percolation Extraction Method, Soxhlet Extraction Method and Maceration Extraction Method. From these methods there will be discussion on the Total Phenolic and Flavonoid Content such as gallic acids. The objective of this review is to study: (1) the effect of using different types of enzyme treatment; (2) the effect of using different types of alcohol solvent; (3) the effect of using different types of non-alcohol solvent; (4) the effect of different extraction method on antioxidant activity from guava leaves. There were a few problem statements that had been figured out from the study that were according to scientific research, free radicals can destroy skin and tissues healthy cells. Today, there are many ways to gain the antioxidants either produced from the chemical reaction or natural sources extraction. The problem statement in enzyme-assisted extraction was that synthetic molecules have been associated with a possible toxicity, and it has been reported that it has some side effects such as carcinogenesis and genotoxicity, which has led to some restraint in its use. The problem statement in alcohol extraction was even though there are a great number of works based on extraction yield in the literature. However, it was not really obvious which types of solvent are more efficient to a particular raw material. This is caused by there being differing properties of solubility in nonidentical solvents and there were too many bioactive compounds that consist of plants. The problem statement in non-alcohol extraction was the effects of phenolic compounds and total flavonoids in the guava leaves extracts by using different solvents. While the problem statement in the Tanning and Percolation extraction method was the effect of antioxidant recovery causes of the temperature. Antioxidants have a high sensitivity with temperature. So, the experiment must be controlled in temperature to provide a high quality and highest recovered antioxidant in Guava Leave. Thus, the result of each method has been determined to show the effectiveness in extracting the antioxidant from guava leaves. For enzyme-assisted extraction method based on the listed enzyme used, complex enzyme-assisted extraction (CEAE) in total soluble bound shown the highest extraction result of phenolic content which were gallic acid, quercetin and quercitrin by 438.8, 258.9 and 134.3 MG/100G DM respectively. Next, for the alcohol extraction method, the result shows that ethanol is the best alcohol type to use compared to methanol and butanol. While the best concentration of ethanol that also affects the extraction, yield is 50% where the TPC recovered is 33.29 GAE mg/g as this used gallic acid as standard to determine the Total Phenolic Content. For non-alcohol extraction method, the results show that the acetone fraction produced the largest amount of phenolic compound in which is 374.63

mg GAE/g, followed by water fraction and chloroform fraction in which are 256.76 mg GAE/g and 100.03 mg GAE/g respectively. Hence, the water fraction shows the largest number of total flavonoids in which is 152.61 mg GAE/g, followed by acetone fraction and chloroform fraction in which are 135.88 mg GAE/g and 96.39 mg GAE/g respectively. Lastly, for tanning and percolation extraction methods the results between three extraction methods were compared with 100 µg/mL concentration of Guava Leaves Extract. The extract has been tested by 2,2-diphenyl-1-picrylhydrazyl (DPPH) to observe the activity of antioxidants that can be recovered by each extraction method. The result shows that the Soxhlet Extraction Method has high Antioxidant recovered compared to other two extraction methods.

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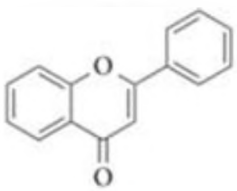
1.0 Introduction

According to Tuyen et al., (2017), he stated the prevention of chemical oxidation had been done by molecules was the definition of antioxidant. It also can be defined by lipid oxidation can be delayed by the oxidative chain initiation reaction where it can be prevented from damage due to the presence of oxygen into the body cells. While the migration of electrons from a substance to an oxidizing agent was a part of an oxidation-reduction, it is also known as oxidation. Destructive chain reactions can occur due to this radical reaction. He also stated the free radical development sometimes caused by the hormones and environmental changes. All oxidation reactions were responsible for these free radicals. However, the chain of reaction can be managed by lessening with the radicals and accordingly destroying their action. So, thiols and phenols families were the most properties that can be found. According to Gulcin, (2020), by delaying lipid peroxidation process, antioxidant compounds can scavenge free radicals and increase shelf-life, which is one of the key reasons for the degradation of food and pharmaceutical products during processing and storage. Wang et al., (2016) has figured out the examples of antioxidants which are lycopene, beta-carotene, vitamins C, vitamin A and vitamin E and more. The bioactive compound capability to retain the structure of cells and their function by successfully in cleaning free radical, avoiding other oxidative damage and stopping the lipid peroxidation was known as antioxidant activity. Anti-cancers, anti-inflammation and anti-aging were the examples of basic other biological functions. Antioxidants for food system use must be low-cost, reliable and non-toxic at low concentrations; highly stable and able to withstand processing; have no smell, taste or color of their own; easy to integrate and have good solubility in the product (Gulcin, 2020). Next, the concepts of antioxidant activity and antioxidant potential are frequently used interchangeably for the assessment of the antioxidant capacity of food components, however it should be understood that they have distinct definitions. Operation refers to the constant rate of a reaction between a particular antioxidant and a particular oxidant, while capacity is a measure of the sum of a given free radical that a sample scavenges.

The chemical structure of polyphenols is actually more important than that of their concentration, as it dictates the rate and extent of absorption and the existence of the plasma circulating metabolites (Gulcin, 2020). Monophenols with a single benzene ring, such as 3-ethyl-phenol and 3,4-dimethylphenol found in fruits and seeds, the hydroxycinnamic acid group comprising caffeic and ferulic acid, and flavonoids and glycosides containing catechins, proanthocyanins, anthocyanidins, and flavonoids, are the simpler phenolic compounds. From Kan Yeung et al., (2019) study, he supported that alpha-tocopherol, anthocyanin, ascorbate, beta-carotene, carotenoid, curcumin, cysteine, flavonoid, flavanol, hydrogen peroxide, kaempferol, N-acetylcysteine, nitric oxide, phenolic acid, uric acid, vitamin C, vitamin E, selenium, and resveratrol were a part of chemical with large citation. Wang et al., (2019) stated the figure:

a)



Flavone[1]
2-Phenyl-4*H*-chromen-4-one

b)