ANTIOXIDANT PROPERTIES OF SELECTED TROPICAL FRUITS

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ABSTRACT

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The antioxidant properties of ethanolic extract of six tropical fruits namely; guava, bignay, siniguelas, star apple, pomelo and calamansi were evaluated. The total phenolic content (TPC) of the samples was determined by Folin-Ciocalteu phenol assay. The order of TPC in mg tannic acid equivalent per 100 g of sample is: guava > bignay > siniguelas > star apple > apple > pomelo > calamansi. This value is inclusive of absorbance correction from ascorbic acid. The antioxidant capacity of the samples were determined by ferric reducing power of antioxidant assay; hydrogen peroxide scavenging activity; and assays on the percent protection of antioxidants against lipid peroxidation, protein oxidation, and whole plasma lipoprotein oxidation. The results consistently showed that at 1, 5, and 10 ppm concentration levels, the order of antioxidant capacity is: guava > bignay > siniguelas > star apple > apple > pomelo > calamansi. All of the tropical fruits have exhibited higher antioxidant capacity than ascorbic acid. Furthermore, guava, bignay, siniguelas and star apple exhibited higher antioxidant capacity than tannic acid. HPLC analysis of guava and bignay revealed six and four peaks respectively. The peaks with retention time (R_t) around 18 minutes were identified as the ones associated with catechin. Guava and bignay contains 7.46 mg and 2.26 mg of catechin per 100 g of sample respectively.

INTRODUCTION

The study on the beneficial effects of plant phytochemicals to human health has been the second golden age of research in Nutrition. The most abundant of these phytochemicals are the compounds known collectively as polyphenols. They are ubiquitous plant secondary metabolites that contain aromatic hydroxyl groups. Studies have shown that consumption of plant foods with high phenolic content reduces the risk of developing coronary heart diseases (Hertog et al, 1995), inhibits carcinogenesis (Yang et al. 2001) and alleviates allergic responses (Yamada et al, 1999). Such health promoting effects are attributed to their potent antioxidant capacity (Ames et al, 1993), their ability to induce anticarcinogenic enzymes (Williamson et al, 1996), and modulate signal transduction systems in the cells (Kobuchi et al, 1999).

Generally, fruits have higher amounts of high quality polyphenols than vegetables (Vinson et al, 2001). A search through the major databases of scientific journals revealed only a few studies on the antioxidant properties of tropical fruits. In contrast, the antioxidant properties of fruits in temperate regions have been studied extensively. The Philippines is blessed with an abundance of natural resources including a plethora of tropical fruit species which could possess high phenolic content and exhibit high antioxidant capacity.

The study of antioxidant properties of plant polyphenols can be done *in vitro* and/or *in vivo*. Antioxidant assays that are done in an artificial environment (e.g. test tube) are considered as *in vitro* tests. These tests determine the direct antioxidant capacity of plant polyphenols under controlled conditions. *In vitro* tests may also involve the use of biomolecules, cells, or tissue taken from living organism. These tests measure the relative ability of the antioxidants to protect cells or its components from oxidative damage. Meanwhile, *in vivo* tests are experimentations

done in or on the living tissue of a whole living organism which include animal testing and human intervention studies. *In vivo tests* are more relevant for investigating the physiological effects of polyphenols but *in vitro* studies often provide more information on their mechanism of action (Crespy and Williamson, 2004).

The most abundant antioxidants in our diet are polyphenols. The study conducted by Scalbert and Williamson (2000) revealed that the average daily intake of polyphenols is about 1000 mg, which when compared to the average daily intake of ascorbic acid, vitamin E, and carotenoids, is about 10-fold, 100-fold, and 500-fold higher respectively. It is therefore important to determine the amount of polyphenols present in vegetables and fruits. The total phenolic content can be estimated by the Folin-Ciocalteu phenol method which is a colorimetric technique. Meanwhile, the kinds and amount of phenolics in plant food can be determined by high performance liquid chromatography.

The present study aims to evaluate the antioxidant properties of six local tropical fruits namely; guava (*Psidium guajava*), bignay (*Antidesma bunius* Spreng.), siniguelas (*Spondias purpurea* Linn), star apple (*Chrysophyllum cainito* Linn.), pomelo (*Citrus maxima*) and calamansi (*Citrus microcarpa* Bunge). Specifically this study aims to accomplish the following: estimate the total phenolic content of six tropical fruits by Folin-Ciocalteu phenol method; determine the antioxidant capacity of polyphenols of the samples using different *in vitro* assays; and identify and quantify the phenolics present in the samples that exhibit the highest phenolic content and antioxidant activity by high performance liquid chromatography.