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EVALUATION OF PHENOLIC CONTENT AND ANTIOXIDANT ACTIVITY IN THE YOUNG CULM OF *Bambusa beecheyana* MUNRO

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ABSTRACT

The potential of bamboo as a source of bioactive substances and natural antioxidants for nutraceutical, pharmaceutical, and dietary sources is the subject of numerous studies today. There is a limited study on *Bambusa* genus, especially *Bambusa beecheyana*, on its phytochemical profiling and antioxidant activity. Thus, this work is a ground-breaking attempt to ascertain *Bambusa beecheyana*'s total phenolic content, total flavonoid content, free radical scavenging activity, and phenolic identification and quantification. Using cold maceration, Soxhlet, and ultrasonic-assisted extraction procedures, the study used ethanol, methanol, and water for solvent extraction. The antioxidant properties of *Bambusa beecheyana* was analysed in term of total phenolic and flavonoid content and DPPH scavenging activity. In addition, extracts which have the highest content of TPC, TFC and potent DPPH value were chosen to be analysed using LCMS to identify potential compound produces in this bamboo. Moreover, the isolation of two cinnamic acid derivates were done by using semi-preparative HPLC. The content of these compounds were quantified by using HPLC-DAD. Therefore, the results from this study reveal that, *Bambusa beecheyana* culm extracts had an increase in the extract's dry yield (1.13-8.81%) but a constant *p*-coumaric acid (**4**) concentration (0.00035 mg/g) for all extraction methods. The bamboo culms were extracted using the ultrasonic-assisted extraction method using just 250 mL of solvent. The Soxhlet methanol culm extract contained high levels of flavonoids (43.89 ± 0.05 mg QE/g) and total phenolics (107.65 ± 0.01 mg GAE/g). When compared to ascorbic acid, the positive control, the extract had the strongest antioxidant activity, with an IC_{50} value of 40.43 g/mL. The Soxhlet methanol extract, the ultrasonic-assisted extract at 40 min., and the cold methanol extract were all subjected to the UHPLC-ESI-MS/MS analysis. A total of five phenolics that contained derivatives of cinnamic acid; ferulic acid, cinnamic acid, 2-hydroxybenzoic acid, *p*-coumaric acid and *p*-methoxycinnamic acid were putatively identified as a result of the investigation. The two cinnamic acid derivatives, which are *p*-coumaric acid (**4**) and *p*-methoxycinnamic acid (**85**) were used as markers to determine the content of these two compounds in all the extracts. The water extracts did not contain either compound. These findings suggested that *Bambusa beecheyana* extract from Soxhlet methanol might be a viable botanical source of natural antioxidants. The chemical composition database provided by this work is crucial for future commercialization on *Bambusa beecheyana* as a great source of functional food.

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CHAPTER ONE
INTRODUCTION

1.1 Research Background

Phytochemicals are compounds with biological action that are primarily produced by plants. Plants are the primary source of many of the active chemicals used in medicinal products. They display pharmacological properties that can be used to treat bacterial and fungal infections as well as chronic degenerative illnesses like cancer and diabetes. Nevertheless, the current focus in scientific research is to discover innovative approaches for their extraction. (Mendoza & Silva, 2018). According to their function in fundamental metabolic processes, the phytochemical components of plants can generally be divided into two groups: primary and secondary metabolites. Primary plant metabolites are more or less similar in all live cells because they are engaged in fundamental life processes. On the other hand, secondary plant metabolites are produced through subsidiary processes like the shikimic acid pathway and are of particular interest when investigating the medicinal effects of herbs. Throughout history, secondary plant metabolites have played a significant role in traditional medicine and folk remedies, effectively treating a variety of illnesses. In modern medicine, these compounds have contributed to the development of lead molecules for creating drugs that address a wide range of health issues, from cancer to migraine. Secondary plant metabolites are categorised based on their chemical structures into various classes (Hussein & El-Anssary, 2019). This systematic categorization aids researchers in understanding their properties and potential medical applications in a more organized and efficient manner.

Undoubtedly, secondary metabolites stand as the foundational elements not only for numerous commercial pharmaceuticals but also for herbal remedies derived from medicinal plants. These plants operate as dynamic chemical factories, churning out an extensive array of secondary metabolites. These diverse chemical constituents of medicinal plants hold inherent biological properties that have the potential to enrich human health across both the culinary and pharmaceutical sectors. Beyond this, their significance extends to industries spanning perfumery, agrochemicals, and cosmetics. Among the wealth of secondary metabolites, alkaloids, terpenoids, and