

## **Polyphenol content and antioxidant activity of different cocoa beans (*Theobroma Cacao L.*) clones from Sabah, Malaysia**

### **ABSTRACT**

The variability of cocoa polyphenol within clones and geographical origin due to factors like genetic diversity and environmental variables, has been reported in previous studies. This study evaluated and compared the polyphenol content of different cocoa bean clones from selected regions in Sabah (Tamparuli, Menggatal, and Penampang). After harvesting, cocoa pods were fermented for five days, followed by a three-day freeze-drying process and grinding into a fine powder. The cocoa powder underwent a defatting process to remove fat content before ultrasonic-assisted extraction was employed to obtain polyphenol extract. Polyphenol content was assessed using total phenolic content (TPC) and total flavonoid content (TFC), expressed as gallic acid equivalent (GAE) and quercetin equivalent (QE), respectively. Antioxidant activity was measured through diphenyl-1-picrylhydrazyl (DPPH) free radical scavenging and ferric-reducing antioxidant power (FRAP), with the result expressed as half-maximal inhibitory concentration (IC<sub>50</sub>) and ascorbic acid equivalent (AAE), respectively. Different cocoa clones were compared for their phenolic content and antioxidant activity based on their regions. In Penampang, PBC 139 exhibited the highest phenolic content (92.9196 mg GAE/g of extract) correlated with lower DPPH IC<sub>50</sub> (0.2558 mg/ml) and higher FRAP value (168.4109 mg AAE/g of extract) relative to BR 25 and MCB C1. In Tamparuli, BR 25 demonstrates the highest phenolic content (88.1000 mg GAE/g of extract) compared to KKM 1, correlating with a lower DPPH IC<sub>50</sub> (0.1512 mg/ml) and higher FRAP (324.8744 mg AAE/g of extract). Lastly, the clone BR 25 sourced from Penampang, Menggatal, and Tamparuli showed significant differences in total phenolic content with BR25 from Menggatal displaying the highest phenolic content (98.9048 mg GAE/g of extract), followed by Tamparuli (88.1000 mg GAE/g of extract) and Penampang (53.5744 mg GAE/g of extract).