

UNIVERSITI TEKNOLOGI MARA

**EFFECT OF PODS STORAGE AND
FERMENTATION DURATION ON
BIOCONVERSION OF
PROANTHOCYANIDINS IN
MALAYSIAN COCOA BEANS**

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ABSTRACT

The research project entitled “Effect of Pods Storage and Fermentation Duration on Bioconversion of Proanthocyanidins in Malaysian Cocoa Beans. The plant that being used in this research is known as cocoa where ripe and healthy cocoa pods were selected and harvested from the different clones. The cocoa itself contains a lot of natural chemical that bring lots of beneficial to our health. For instance, the proanthocyanidins content in the cocoa is a powerful antioxidant which 20 times larger than vitamin C and 50 times larger than vitamin. These two factors being studied where pods storage duration were varied as 0, 2, 4 and 6 days. Meanwhile, the fermentation duration of cocoa beans differs from day 0 until day 5. The sample that being ferment were defatted before undergo the extraction process. The extraction process undergoes overnight by immersing the sample with the methanol solvent and placed it in 4°C incubator. The total proanthocyanidins content were analyzed by using UV Spectrophotometric and High-Performance Liquid Chromatography (HPLC) analysis. Multiple linear regression method was used in order to relate the relationship between concentrations of proanthocyanidins with the absorbance value taken from UV Spectrophotometric analysis. The regression value of this research was $R^2 = 0.9486$. However, the external standard (ESTD) quantification method was being utilized in the HPLC analysis where it only uses one concentration of catechin standard. The total proanthocyanidins contents in all samples from different pods storage and fermentation duration are varied from the both analyses. ANOVA analysis definitely revealed that fermentation duration has a significant effect to the bioconversion of the proanthocyanidins in Malaysian cocoa beans. Meanwhile, the pods storage might have $2.36E-08 \pm 1.2E-05$ effect toward bioconversion of proanthocyanidins. Since it < 0.05 , it is considered negligible. It can be concluded that pods storage duration does not have significant effect to the proanthocyanidins bioconversion.

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CHAPTER 1

INTRODUCTION

1.1 RESEARCH BACKGROUND

The scientific name cocoa tree known as *Theobroma cacao* was given by the Swedish botanist, Carl Linnaeus in year 1753. The *Theobroma* was taken in the Latin word which means ‘food of the gods’ and *cacao* is taken from the Nahuatl (Aztec language) in the term of *xocolatl* which taken from separated word *xococ* (bitter) and *atl* (water) (Coe & Coe, 2010). *Theobroma* consists of several species such as Brazilian species called as *Theobroma cupuacu*. This type of cocoa offers a bitter-sweet flesh and widely used in juice drinks in the Amazon. There are three most common type of cocoa bean that is mainly used in the production of chocolate which are Criollo, Forastero and Trinitario. The rarest and most expensive fine grade cocoa is Criollo and a large group of wild and cultivated cacao which covers 70% of the world production is Forastero (Porter, Ma, & Chan, 1991) . Meanwhile, Trinitario is a fine grade hybrid of Forastero and Criollo. The *Theobroma* genus is one in the family of Malvaceae which also known as the mallows. It has more than thousand species such as cotton, hibiscus, okra and marshmallow.

Cocoa tree turn out to be the main source for one of the world’s delicious and enjoyable products which is chocolate. This plant is normally grows in lowland tropical forests with little seasonality. This type of plant usually is found widely in the northwestern South America. This plant also can be found in two East African countries which are Ivory Coast and Ghana where it covers half of the world demand (Edi et al., 2014). However, it also has been introduced as a crop plant in many tropical African and Asian countries. Cocoa tree is a very valuable plant and known to have antioxidant compounds which bring a lot of benefits for our health by reduces the risk of may chronic illness such as high blood pressure, cholesterol, obesity, constipation, diabetes, and others. These plants are known to have more than 300 healthful compounds. These healthful compounds include theobromine, phenyl ethylamine and many polyphenols. As much disease had become the major health