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REACTION, ISOLATION AND CHARACTERIZATION
OF CAFFEINE FROM FOUR VARIETIES
OF COFFEE (*Coffea* sp. L.)

RESEARCH STUDY

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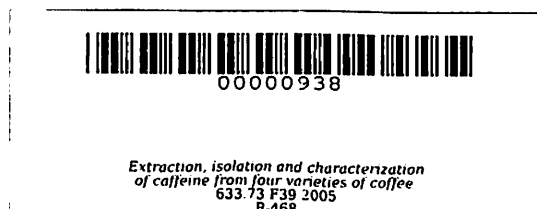
APRIL 2005

**EXTRACTION, ISOLATION AND CHARACTERIZATION OF CAFFEINE
FROM FOUR VARIETIES OF COFFEE (*Coffea* sp. L.)**

**Research Study
Presented to the Faculty of
Science High School College of Education
Cavite State University
Indang, Cavite**

**In partial fulfillment
of the requirements for Graduation**

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April 2005

ABSTRACT

FERNANDEZ, ROWEE ANN C., FERRE, KIRSTIE CAMILLE L., and GALVEZ, JOSEPHINE JOY E., Applied Research III (General Science Curriculum), Cavite State University, Indang, Cavite, April 2005. **“EXTRACTION, ISOLATION AND CHARACTERIZATION OF CAFFEINE FROM FOUR VARIETIES OF COFFEE (*Coffea sp.* L.)”**. Adviser: Ms. Miriam C. Du.

The study entitled “Extraction, Isolation and Characterization of Caffeine From Four Varieties of Coffee” was conducted at DOST, Taguig, Manila and Physical Science Department, Cavite State University, Indang, Cavite from September 2004 to January 2005. This study aimed to: 1) determine the percentage yield of caffeine from the beans of four varieties of coffee; 2) determine the physical and chemical properties of caffeine from each variety of coffee; 3) determine the R_f values of the caffeine extracted; and 4) determine which variety has the least amount of caffeine.

The percentage yield of caffeine extracted from four varieties of coffee was computed. It was found that the highest percent of crude caffeine (10.55%) was obtained from Arabica variety, while the least (1.62%) was obtained from Liberica variety. Caffeine from Arabica, Excelsa, Liberica and Robusta varieties were subjected to physical and chemical analysis. Results showed that caffeine from four varieties of coffee were slightly soluble in polar solvent but insoluble in non-polar solvent such as ether, benzene and chloroform. The melting points of the caffeine extracts ranged from 229⁰C to 232⁰C compared to the caffeine standard that ranged from 235⁰C to 238⁰C.

Chemical analysis revealed the presumptive evidence that the extracts obtained were really caffeine because of the white precipitate and shiny substance formed indicating the presence of amine and aldehyde group respectively. Ferric chloride test indicated the absence of tannins.

Thin Layer Chromatography was used to determine the Rf values of the caffeine extracted and to compare it to that of the caffeine standard. Results showed that the Rf values of caffeine from four varieties of coffee were close to each other but were not close to that of caffeine standard. The result could also be due to the uncontrolled condition of the caffeine extracts as stored at room temperature, thus it went partly through oxidation reaction before subjecting to chromatography analysis.

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A research study submitted to the faculty of the Science High School, College of Education, Cavite State University Indang, Cavite in partial fulfillment of the requirements for graduation under the guidance and supervision of Ms. Miriam C. Du.

INTRODUCTION

Coffee is a deciduous tree belonging to the Class Dicotyledonae, subclass Sympetalae or Metachlamydae, and order Rubiales. It is the term applied to trees of the genus *Coffea* that belongs to the botanical family Rubiaceae. The term is also applied to the beans of these trees and to the beverage brewed from them. Family Rubiaceae has some 500 genera and over 6,000 species. Most are tropical trees and shrubs that grow in the storey of forests.

The two most important species with economic importance are *arabica* (Arabica Coffee) which accounts for over 70% of world's production, and *robusta* (Robusta Coffee). Two other species, which are grown on a smaller scale, are *liberica* and *excelsa* (<http://www.coffee.com>).

Coffee has several biochemical compounds such as alcohol, oil, sugar and caffeine. Different varieties of coffee contain varying amounts of these compounds. Caffeine is an alkaloid that occurs naturally in tea, coffee and in cola. It is also present in