ASIAN GREEN MUSSEL (*Perna Viridis*) AND OYSTER SHELLS (*Crassostrea gigas*) AS PARTIAL REPLACEMENT OF CEMENT IN THE PRODUCTION OF TILES

Research Study

ASHLEY NICOLE P. GEÑEGA
JAEDINE ANDRE GUANLAO

Science High School
CAVITE STATE UNIVERSITY
Indang, Cavite

May 2017

ASIAN GREEN MUSSEL (*Perna Viridis)* AND OYSTER SHELLS (*Crassostrea gigas)*AS PARTIAL REPLACEMENT OF CEMENT IN THE PRODUCTION OF TILES

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

In partial fulfillment
of the requirements for Research II

ASHLEY NICOLE P. GENEGA
JAEDINE ANDRE GUANLAO
May 2017

ABSTRACT

GEÑEGA, ASHLEY NICOLE P., and GUANLAO, JAEDINE ANDRE Asian Green Mussel (*Perna Viridis)* and Oyster Shells (*Crassostrea gigas)* as Partial Replacement Of Cement in the Production of Tiles. Research Study. Science High School (General Science Curriculum), College of Education, Cavite State University, Indang Cavite. May 2017. Adviser: Engr. Roslyn Peña.

The study entitled "Asian Green Mussel (*Perna Viridis)* and Oyster Shells (*Crassostrea gigas)* as Partial Replacement Of Cement in the Production of Tiles" was conducted from September 2016 to April 2017 at Bancod, Indang, aimed to develop tiles using Asian green mussel and oyster shells as partial replacement for cement. Specifically, it aimed to: determine the best combination of mussel and oyster shells in development of tiles; determine the characteristics of the tiles in terms of strength, texture, and color produced from Asian green mussel and oyster shells; determine the cost of production of the Asian green mussel and oyster shells.

The researchers used the following treatments in the conduct of the study; T_0 – 0% oyster shells, 0% mussel shells, 100% cement, 100% sand; T_1 – 10% oyster shells, 10% mussel shells, 80% cement, 100% sand; T_2 – 20% oyster shells, 20% mussel shells, 60% cement, 100% sand; T_3 – 30% oyster shells, 30% mussel shells, 40% cement, 100% sand; T_4 – 40% oyster shells, 40% mussel shells, 20% cement, 100% sand; T_5 – 100% oyster shells, 0% mussel shells, 0% cement, 100% sand; T_6 – 0% oyster shells, 100% mussel shells, 0% cement, 100% sand.

The binder used in the conduct of the study was a mixture of powdered oysters shells, powdered mussel shells, and cement. The seashells were powdered manually by means of a hammer or other pounding equipment like *lusong* where the seashells' particles were made fine. The powdered shells were strained by means of sieve (No.35) to segregate the bigger particles

from the finer ones. The powdered Asian green mussel shells and oyster shells together with the port land cement and sand were mixed and were added with water. The prepared mixtures were poured into the assigned molders. The molded tiles were dried under room temperature and were removed from the molders after 24 hours and weighed at the 7^{th} day. The produced tiles were brought to DOST, Taguig City for the bending strength test and was surveyed by 30 participants all throughout including engineers, architects, and construction workers in terms of the color and texture.

Treatment 5 and 6 did not produce a hardened tile upon sun drying, only treatments 0 to 4 formed hardened tiles.

Based on the sensory evaluation of the produced tiles with 30 respondents, the best combination of Asian green mussel and oyster is treatment 4 with a 40% oyster shells, 40% mussel shells, 20% cement, and 100% sand, gave the highest modulus of rupture of 6.55MPa. This is followed by treatment 3 with a 30% oyster shells, 30% mussel shells, 40% cement, and 100% sand, gave the modulus of rupture of 6.40 MPa.

The cost of production is, P 7.85/tile for treatment 1, P7.89/tile for treatment 2, P 7.94 for treatment 3 and P 8.00 for treatments 0 and 4.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDIX FIGURES

ASIAN GREEN MUSSEL (*Perna Viridis)* AND OYSTER SHELLS (*Crassostrea gigas)*AS PARTIAL REPLACEMENT OF CEMENT IN THE PRODUCTION OF TILES

Ashley Nicole P. Genega
Jaedine Andre Guanlao

A research study manuscript submitted to the faculty of Science High School, College of Education, Cavite State University, Indang, Cavite in partial fulfillment for graduation under Contribution No._____. Prepared under the supervision of Engr. Roslyn Peña.

INTRODUCTION

Tile production is one of the world's oldest industries. The earliest known examples of brick/tile making is dated back in 4500 years to the Region of Sargon I and Akkad in Babylonia. From this early industry of tile making, the ancient people of Sargon and Babylonians described tiles as thin slabs of glazed or unglazed fired clay or anything hard and brittle. Due to the outburst of technology, tiles at present are improved and are being used structurally or decoratively on floors, walls, and roofs. They can be thin slabs of glass, plastics, stone, asphalt, clay, acoustically absorbent materials such as asbestos, as well as hollow ceramic blocks used structurally.

The Asian green mussel (*Perna viridis*), also known as the Philippine green mussel, is a bivalve belonging to the family Mytilidae. The mussel is economically important in several countries where it is harvested for food; however it is known to harbor toxins, which are hazardous to human health and cause damage to submerged structures such as drainage pipes. It is native in the Asia-Pacific region and was