

***BACILLUS THURINGIENSIS* (BERLINER) STRAINS FROM SOIL SAMPLES IN
THE BARANGAYS OF BANILAD, TALAMBAN AND PIT-OS, CEBU CITY**

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University of San Carlos

Cebu City

In Partial Fulfillment of the Requirements for the
Degree of Master of Science in Biology

by

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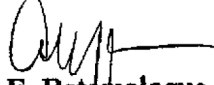
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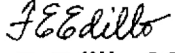
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This thesis entitled " *BACILLUS THURINGIENSIS* (BERLINER) STRAINS FROM SOIL SAMPLES IN THE BARANGAYS OF BANILAD, TALAMBAN AND PIT-OS, CEBU CITY " prepared and submitted by Agnes D. Tomayao in partial fulfillment of the requirements for the degree of Master of Science in Biology has been examined and is recommended for acceptance and approval for ORAL EXAMINATION.

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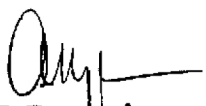

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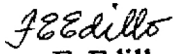
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ABSTRACT

A total of six strains of *Bacillus thuringiensis* were isolated from natural soil environments of Talamban, namely: University of San Carlos-Technological Center and Retreat House at USC Talamban Campus, Nasipit, Talamban Proper, Pit-os, Ma. Luisa Park, Foodland, Holy Family Village II, Dona Rita Village and Sto. Nino Village. The frequency of *Bacillus thuringiensis* among *Bacillus* colonies was 1.2%. All isolates were large, spore-forming, gram-positive and motile. Growth was observed in nutrient agar slant at pH 5.7 and nutrient broth at pH 6.8. In the qualitative toxicity test, strain 311 and strain 312 showed larvicidal activity against *Papilio demoleus* larvae, while four out of the six strains did not exhibit insecticidal activity against larvae of *Papilio demoleus*. None of the six isolates showed larvicidal activity against the larvae of *Aedes aegypti*.

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CHAPTER I

THE PROBLEM AND ITS SCOPE

Introduction

The Philippine vegetable industry has been beset with low productivity and poor quality vegetables. For a decade now, farm yield declined at an average annual rate of 1.2%. In 1992, production dropped by 1% to 426,77 metric tons (mt) from 431,231 mt the previous year. This is largely due to insect infestation leading to loss of crops. The threat of pesticide poisoning from contaminated vegetables compounded the problem on how to make the industry productive to tap the domestic market and to cater to the needs of local food manufacturers (Carandang, 1994:10).

On the other hand, blood sucking insects such as mosquitoes and blackflies are vectors of a multitude of diseases of man and animals through transmission of pathogenic viruses, bacteria, protozoa and nematodes. It is estimated that malaria has an annual incidence of 200-300 million cases resulting to one million deaths. This makes malaria the single largest killer of mankind. Viral diseases transmitted by various mosquito species include the yellow fever, dengue fever and several forms of encephalities. Filaria is the most common disease of the tropics. The World Health Organization (WHO) estimates more than 250 million individuals are infected with the nematode, *Wuchereria bancrofti*, which in severe cases gives rise to gross deformity as elephantiasis. Dengue fever is one of the most virulent diseases, which occurs throughout the tropical and subtropical regions in the world, frequently in epidemic waves. Generally, it is a prostrating disease, but a recent form, dengue hemorrhagic fever has mortality of 20% among afflicted children in Southeast Asia. Blood

sucking insects in addition to spreading a myriad of diseases, are responsible for lowering the quality of human life and reducing livestock production by annoyance and blood-feeding (Lacey and Undeen,1986:265; Priest,1992:357; Mosq. Control,1973:1-2).

DDT (dichloro- diphenyl-trichloro-ethane), the first organochlorine insecticide, was very effective in controlling vector and pestiferous insects that it revolutionized both agriculture and public health. DDT provided excellent, wide-ranging control at low cost but persistence in the environment together with accumulation in animal fats led it to being banned. Organophosphates (parathion, malathion etc.) and carbamates are widely used in mosquito and blackfly control programmes, they are degradable in nature but are known to be highly toxic to man (Kline, et al., 1985 cited in Priest, 1992:358). The main drawback of these chemicals is the high rate of resistance development in target species, that many of them are now useless.

Approximately 2 million cases of pesticide poisonings occur each year in Asia and Pacific region, 40,000 of which probably result in death. Exposure is highest among men, and death rates rise significantly in communities where insecticides have been introduced on an intensive scale. There is also evidence of health risks from fish caught in pesticides contaminated ponds, paddies and irrigation channels. New pest biotypes have emerged in response to large applications of some pesticides, thus decreasing the stability of crop production. Subsidies, ignorance of the risk of applying large amount of insecticides and the continuous use of pesticides that are banned in industrial countries are the factors that caused excessive use of pesticides (Pearce and Warford,1993:10).

The concern over the environmental impact (biomagnification) of intensive use of synthetic organic chemicals, the development of insect resistance and its toxic effects to man,