CHAPTER I

INTRODUCTION

One of the pollution problem of the aquatic ecosystem is the contamination from chemical substances. Industrial wastes and other source such as agrochemical, urban wastes contain a variety of toxic inorganic, metallic, and organic compounds. The chemical substances are toxic to all aquatic life, change the water physical property and affect on nutrient cycling. The polluted water is also toxic to other terrestrial animals, it is the course of water resource lost. Most of the chemical compounds can deposit in aquatic ecosystem, water suspend, sediment, and accumulate in aquatic life. The accumulated compound can be transferred from the lower species via food chain or food web to the upper species, and then to the human.

In nature, many plants produce some chemical compounds, which are called "alleochemical" to protect themselves from insects and other pests. The alleochemical are toxic or bad tested for insect. (Jittihansa, 1989) There are many research about the use of plant extract for pest control. Various plants are extracted and tested for their bioactivity. Some of plant extract can be used as insect repellent, biotoxin and it will be substituted for chemical insecticide. In the past, many kind of *Derris spp.* such as *Derris malaccensis* , *Derris trifoliata* are used as herbal medicine, piscicide, and insecticide.

Derris trifoliata, usually found in Thailand's estuarine area. *Derris trifoliata* is climbing growth form. It was used as herbal medicine. There are many chemical compounds such as Ceryl alcohol (Sodachan, 1967), rhanetin3-o-β-neohesperidoside, quercertin3-o-β-neohesperidoside (Ramachandran *et al.*, 1986), β-amyrin, luperol, β-sitosterol, stigmasterol, lonchocarpol-A from leaves extract (Veerachato *et al*, 1992). Fish poison such as rotenone, toxicarol, deguelin are also reported (Miller, 1935) and some insecticide compounds such as scandenin, warangalone (scandenone), nallanin, chandanin (lonchocapic acid) from root extract (Wongsiri, 1978). Udomsilp *et. al.* (1986) found some of fungicide compounds.

Although, the plant extract can be used for control the pest and safe for user more than other synthetic pesticides and also easy degrade in the environment. The application of plant extract for a long period of time may produce the pollution problem affect to non target species.

Nowadays, aquatic toxicology tests are established to detect and evaluate the potential toxicological effects of chemicals on aquatic organism. The data are used for determine compliance with permit toxicity limits, to aid in the development and implementation of toxicity reduction plans, and to assess risk strategies.

In this study, Nile tilapia *Oreochromis niloticus* is the fish that were selected for determine the toxicity of *Derris trifoliata* leaves extract. Nile tilapia is easy to culture in laboratory, commercially importance, widely abundant. It is a good represent of Thailand's freshwater fish. The static non-renewal test was used to determine LC50 during 96 hours for acute toxicity. The static renewal test was set-up for study sub-acute toxicity, and collected fish livers for histopathological study. The histopathological of fish liver may serve to identify cause of death and possibly causative agent. This information along with physiological and biochemical data may provide a more complete and accurate description of the activity of a chemical agent. (Rand and Petrocelli, 1985)

The data from this study are used for predict potential toxicity of *Derris trifoliata* leaves extract, and risk assessment. Modification of these data are also used in toxicity reduction plans and determine compliance with permit toxicity limits.

Objective

1. To determine acute toxicity of *Derris trifoliata* leaves extract on *Oreochromis niloticus* during 96 hours.

2. Study on histopathology of the fish liver, expose to *Derris trifoliata* leaves extract during 5 months at sub-acute toxicity.

3. To determine sub-acute toxicity by comparison of growth rate and relative weight index between and among group.

Anticipated Benefits

1. To provide data, which are used for predict potential acute and sub-acute toxicity of *Derris trifoliata* leaves extract and used for risk assessment.

2. These data are also used in toxicity reduction plans and determine compliance with permit toxicity limits.

Scope of The Study

The scope of this study is mainly to determine the toxicity potential of *Derris trifoliata* leaves extract in which exposure to Nile tilapia *Oreochromis niloticus*. The toxicity potential determined by the term of LC50 during 96 hours in acute toxicity. Sub-acute toxicity were studied by observed the histopathological and ultrastructural alteration of Nile tilapia liver during five months of sub-acute experiment. The water quality parameters (pH, temperature, dissolved oxygen, hardness) were recorded during the experiments. The static non-renewal technique was used for the acute experiment, and the static renewal technique was used for the sub-acute experiment. The test chemicals were water soluble part and water insoluble part of *Derris trifoliata* leaves extract. Juvenile Nile tilapia *Oreochromis niloticus* aged 30 days was used for test organism against the toxicity potential of *Derris trifoliata* leaves extract. The experiments were conducted at the Department of Biology, Chulalongkorn University.