

CHAPTER 1

INTRODUCTION

Forestry plays a main role in the environmental protection and solves socio-economic problems in Vietnam in general, and in Thua Thien Hue province in particular. Natural forests in the province occupy about 75% of the total forest - covered area. Plantation forests, which make up the remaining area, are named by planted species such as acacia, eucalyptus, cinnamon, pine, indigenous species, or mixed forests. Pine forests account for 17% of total plantation forest area, and it contributes to 59% of the plantation forest volume that was estimated in Thua Thien Hue (sub-FIPI, 1999). There are three main species existing in the pine forests in Thua Thien Hue namely *Pinus khaya*, *P. caribaea*, and *P. merkusii*. However, *P. merkusii* is a dominant species, which accounts for more than 90% of the total area of pine forests. In addition, the three species are planted for different purposes. *P. Merkusii* pine forests produce resin, the others two species are planted to harvest wood or for tourism purposes (TTH-DFD, 2004).

Pine trees considered one of the main trees for forestry development strategies in the province due to their resin product with high export value. Despite that fact that pine forests are important for both economic and environmental purposes, they are not paid adequate attention. The most serious consequence of inadequate cares was the outbreaks of pest occurred frequently and caused widespread epidemic spells over large areas. The outbreak of pest affects not only the growth rate of pine trees, the yield of the resin, but also the living environment because the larvae of the pests are very harmful to people, especially children, who live near the infected forests. After being destroyed by the outbreak of pests, the forests become fallow; almost the pine-trees leaves are eaten or dropped. As a consequence, soil-retention function of the pine forests is not effective; soil is eroded which cause high risk of flooding in low land areas (PIAWFR, 1994).

P. merkusii is the host of several kinds of forest insect pests and diseases. However, pine caterpillar (also called mason pine moth) is the most dangerous one (PIAWFR, 1994). Caterpillars (Order: Lepidoptera; Family: Lasiocampidae) comprise a major group of species, which destroy the leaf of forest trees. The species of Caterpillar group can reproduce rapidly, Moth population density changes easily from low to high in a few generations, and their population explosion can cause widespread mortality to forest trees. The masson pine moth, *Dendrolimus punctatus* Walker, is endemic to Southeast Asia. It is a particularly irruptive species and the most serious defoliator of merkus pine forests. It may cause 100% defoliation (Zhang *et al.*, 2002).

In Thua Thien Hue province, the pine caterpillar explosion was first recorded in 1987 when about 20.5 ha of pine forests in the province were affected. An survey on the impacts of *D. punctatus* explosion on pine forests conducted by the TTH-DFP (2004) shows that pine forests throughout the province has experienced certain degree of defoliations caused by the caterpillar. During the period of 17 years, from 1987 to 2003, 12 epidemic outbreaks occurred and recorded. Thus, pine - trees are very vulnerable to *D. punctatus* and a majority of the pine forest area normally undergo some times of serious defoliation epidemics during their life span. However, the tendency and management of the forests were neglected and no strategic planing and controlling was implemented to reduce the risk of pest outbreaks. The methods used to predict and prevent the outbreak were not appropriate. Dien (1997) suggested some methods to predict the outbreak. These methods are based on the relation between cocoon density, sexual ratio and the age of forest; or the relation between egg density and forest age; or the density of larva at different stages. Other methods which are based on larva density or the relation between the proportion of larva distributed and area infected, have been tried to predict the trend of epidemic (Duc, 2000). These prediction methods of pest outbreak often take a lot of time and require specific knowledge (DFP, 2001). Though it is obvious that pest outbreak causes large-scale damage for pine forests, little information and understandings has been derived from previous studies.

The purpose of this study is to find out the factors that promoting the outbreak of pine caterpillar, *D. punctatus* Walker, in pine forests of Thua Thien Hue province. The study focuses on developing the relationship between larva density, probability of outbreak occurrence and some readily available factors such as the age of forests, monthly weather factors (average temperature, highest temperature, lowest temperature, relative humidity, total rainfall, number of rainfall days, and number of sunshine hours) by using multiple regression analysis and logistic regression analysis methods. The data was collected during 17 years (from 1987 to 2003) in December when the outbreaks occur at a high frequency, and the field survey was conducted in December 2004. This study was designed to attain the following objectives:

1. To describe the distribution of pine caterpillar outbreak and other relative factors.
2. To develop and validate statistical models of pine caterpillar in pine forest of Thua Thien Hue province.