

## CHAPTER ONE

### Introduction

Asian corn borer (ACB), *Ostrinia furnacalis* (Guenee) is a major pest of corn, *Zea mays* L. in Yunnan (Lu 1992). It is widespread with serious infestations in over 280 thousand hectare which account for 36% of the total cultivated area. The corn yield loss caused by Asian corn borer is estimated about 25,000 tons annually, making it a pest of economic importance (Lu 1992). In China, the Asian corn borer have been routinely controlled with insecticides. Since chemicals still continue to be the major means of defense against Asian corn borer, the consequences of using these chemicals have been reported by many workers (Zhang 1981, Mu and Wang 1987, YBS 1991, Lu 1992). Hexachlorocyclohexane (HCH) has been commonly applied in areas where corn have been planted twice a year (Mu and Wang 1987). This has resulted in substantial increase in the resistance of Asian corn borer amounted to 13.4-time higher than that of areas where corn have been cultivated only once a year (Mu and Wang 1987). Within corn cropping system, the population density of parasitic, *Bracon chinensis* Szepl., decreased 31.25% after 7 days when Furadan was used, and the percent of parasitism of *Eriborus terebrans* (Gravenhorst) declined from 27% to 10.6% after Di-Syston application (Hou et al. 1984). The outbreak of secondary insect pests such as *Dactylispa selifera* Chapuis and *Proceras venosata* (Walker) has been reported by Zhang (1981) and Lu (1992). The cross resistance of Asian corn borer to Carbouran and Sumicidin (Fenvalerate) has been reported by Mu and Wang (1987). In addition, the broad-spectrum insecticide can be hazardous and cause undesired side effects, both in agricultural and nonagricultural

ecosystems (Hirai 1991), and the economical return of insecticide programs has also decreased as the price of insecticides increasing (YBS 1991).

The difficulties related to the use of chemicals, suggested that current insecticides spray practices may not fit well with the integrated pest management programs. Thus, a research for the proper timing of insecticide applications (Poruess 1983, Pedigo 1989) is required for the Asian corn borer management programs. The concept of degree-day by many workers successfully used to predict the phenology of corn borer (Apple 1952, Jarvis and Brindley 1965, Zhang et al. 1979, Showers et al. 1983, Despins and Roberts 1984, Boivin et al. 1986).

To combine the Asian corn borer's life system with the degree-day model should yield the necessary information for Asian corn borer control measures. The major objectives of this work were to determine the effect of temperature on the duration of development and population growth of *O. furnacalis* under laboratory conditions, the phenology of the Asian corn borer in relation to degree-days under field conditions, and the role of density dependent mortality factor of Asian corn borer in Yunnan of People's republic of China. Findings from these experiments will enhance the implementation of pest management for the control of Asian corn borer.