CHAPTER 1

Introduction

1.1 Historical Background

The Royal Project Foundation (RPF) was initiated by H.R. the King Bhumipol Adulyadej in 1969 with the aim of helping the ethnic groups out of poverty, malnutrition and poor health. At that time, the opium poppy was grown for growers use and for the illegal narcotic market. In order to gain enough arable land, slash and burn cultivation was widely practiced which led to the vast deforestation areas. Starting about 40 years ago up to present, the RPF has introduced more than one hundred kinds of exotic plants to highland farmers in the five northern provinces of Thailand. Among the introduced crops, temperate vegetables were readily accepted by farmers because of their high value and strong market demand. Since, farmers could grow vegetables many times a year they could gain a substantial income. Cucurbitaceous crops e.g. zucchini (*Cucurbita pepo*); Japanese pumpkin (*C. moschata*) and Japanese cucumber (*Cucumis sativas*) were ranked as the leading vegetables in the region. In 2009, the income from selling the three crops was 4,151,051, 8,022,803, and 281,400 Bht respectively. However, the cucurbits are always subject to many diseases and other plant pests. Viral diseases of cucurbit are very common and cause serious damage to these vegetables. In most cases it is very difficult to identify specific virus infection by using symptoms. It is questioned that the different levels of viral disease severity depends on the kind and combination of virus infection that leaded to viral synergism as reported by Pruss *et al*. (1997). Common viruses found infecting cucurbits were ZYMV, SqMV, WMV-2 and PRSV-W (Davis *et al.,* 2002; Kemble *et al.,* 2005; Jossey and Babadoost, 2008; El-Shamy, 2010). In addition, CGMMV, melon necrotic spot virus (MNSV), and cucurbit aphid-borne yellow virus (CABYV) were also reported as the serious diseases in many cucurbit growing regions (Tomassoli and Barba, 2000; Yuki *et al*., 2000; Choi, 2001). Single or double infections of cucurbit species by either potyviruses; ZYMV or WMV or cucumovirus; CMV, were very common and caused considerable damages

worldwide (Luis-Arteaga *et al*., 1998). Double infection by ZYMV and CMV in zucchini showed strong synergistic pathological responses in mixed infection were reported by Wang *et al*. (2002) and Malik *et al*. (2010). So, the purposes of this study were to identify the viruses found in the infected cucurbits, investigating the interactions of the different viruses found in the host plants, yield loss caused by virus infection, and the symptoms created from synergism of the viruses.

1.2 The objectives of this study

1.2.1 To identify the viruses found in the cucurbitaceous crops (zucchini, Japanese pumpkin and Japanese cucumber) cultivated at 3 locations of the Royal Project areas in different seasons.

1.2.2 To study the correlation of insect vectors, alternate hosts and virus diseases in cucurbits.

1.2.3 To evaluate the seed transmission virus in commercial cucurbits seeds and yield loss caused by those viruses.

1.2.4 To investigate the cucumber green mottle mosaic (CGMMV) transmitted seeds, possible infection at different growing stages and crop loss caused by this virus.

1.2.5 To study the synergistic effects of multi-virus infection on the symptom expression and disease severity in zucchini.