# CHAPTER 1

## INTRODUCTION

Seed-borne disease is an important threat to crop yield and may degrade product quality. Barley (*Hordeum vulgare* L.) seed can be attacked by many seed-borne fungi (Hassan, 1999; Medina *et al*., 2006). The infection can reduce grain yield, seed vigor, germination and also have the potential effect on malting and malt quality, brewing performance and beer composition (Cook, 1962; Schwarz, 2001; Medina, 2006) more importantly the pathogen can produce several mycotoxins (Kamil, 2007). At present, in the attempt to control these disease, large quantities of barley seed are treated by seed dressing with chemical fungicides. However, an extensive use of fungicides have been found to cause risks for pollution to the environment with not only for leaving residuals in seed but also for negative influences on the health of people regularly working with them. Another restriction is the development of pathogen resistance to commonly used chemical compounds. One possible alternative to eliminate seed-borne pathogen are thermal processes such as hot water treatment which has been in practice for sanitization of seed from seed-borne disease. However, the treatment may cause seed germinability reduction. A recent innovative approach to eradicate seed-borne pathogen is the use of radio frequency (RF). The thermal energy of RF is transported into the material by an alternating electromagnetic field and heat can be generated within the product rapidly. The major advantage of using RF is that no chemical residuals are left in the material and hence there are on adverse effects on human beings and the environment. Earlier research has shown that RF heating treatment is effective for decontamination in food material and many agricultural products (Cwiklinski and Hörsten, 2001; Geveke *et al*., 2002; Vassanacharoen *et al*., 2006). However, the application in the field of seed-borne control is very limited and appeared only a few reports.

Therefore, the aim of this study was to investigate the efficiency of RF on controlling seed-borne fungi in barley seed and their effect on seed quality and chemical composition, as and alternative leading to new methods for solving problems concerning seed-borne fungi.