Chapter 1

INTRODUCTION

Wheat (*Triticum aestivum* L.) is the most widely cultivated of all cereals. It is grown extensively over a broad range of climatic conditions and soils, and consequently has a wide geographical distribution.

The area of the wheat cultivation is on the increase in the world. Now in the more tropical countries such as Thailand, the Philippines, and Indonesia; there is increasing interest in domestic wheat production. Wheat production in Bangladesh increased from almost nothing before 1970 to 648,000 hectares by 1985 (Hossain, 1988).

Rice-wheat cropping system seems to have great potential particularly in the northern regions of Thailand where there are about 0.5 million hectares of irrigated rice land and the temperature is sufficiently low in the cool season which favored the wheat crop but the low night temperature may limit some tropical crops. Rice-wheat rotation, therefore, offers an improvement in land and water-use efficiency, with its short growing season and better adaptation to cool weather (Jongkaewwattana *et al.*, 1982).

Sterility of wheat has occurred in many places in the world. Many factors have been reported to cause ear sterility in wheat. For example, effects of low temperature (Kim *et al.*, 1985); high temperature (Kirichenko *et al.*, 1975); and deficiency of copper (Graham, 1975) and boron (Li *et al.*, 1978, Silva and Andrade, 1983) have been reported. This study focuses on sterility affected by B deficiency in wheat.

In Heilongjiang province of China, sterility caused by B deficiency occurred over 40,000 hectares; yields were reduced to less than 750 kg/ha in some fields and completely lost in others (Li *et al.*, 1978). Sterility caused by B deficiency has been frequently observed by CIMMYT outreach staff and in local publications cited by Rerkasem *et al.* (1990) in the following areas: western part of Yunan province of China (C. E. Mann, pers. comm.), the central west region of Brazil (Silva *et al.*, 1983), Northern Thailand (Rerkasem *et al.*, 1989), the eastern Terai and other parts of Nepal (Sthapit *et al.*, 1989), and throughout Bangladesh (Saunders, pers. comm.). At Chiangmai University in 1987/88, poor grain set caused by B deficiency in wheat depressed seed yield by 40-50% (Rerkasem *et al.*, 1989).

The differences among wheat genotypes in their responses to B deficiency have been documented (Rerkasem *et al.*, 1989). However, mechanisms on tolerance to B deficiency have not been known well in wheat. The evaluation of mechanisms on differential tolerance to B deficiency among wheat genotypes, therefore, may help in managing wheat production in low B soil; and in the identification and manipulation of tolerant genotypes to B deficiency.

This study was conducted: 1) to evaluate the responses to B deficiency at various stages of development; 2) to establish the relationship between the responses to B and plant B status, in order to predict effects of B deficiency on grain set and grain yield; and 3) to examine the responses to B on different dates of sowing.