In northern and northeastern of Thailand, where wheat and barley are being promoted, boron (B) is one important yield limiting factor. Boron deficient soils are widespread in both the north and northeast. Sterility, grain set failure and low yield are caused by B deficiency. The effect of B deficiency is rarely observed on vegetative growth and development in wheat. The story in barley is somewhat confusing. At the level of B deficiency that depressed grain set there are reports of vegetative growth being enhanced as well as depressed. This study set out to compare B responses in wheat and barley genotypes. Two experiments were carried out in sand culture in the 1998/1999 and 1999/2000 seasons, at the Faculty of Agriculture, Chiang Mai University.

The first experiment evaluated three wheat genotypes (Fang 60, SW 41 and Tatiara) and barley (BRB 9, BCMU 96-9 and CMBL 92029) at 4 levels of added B in the nutrient solution (0, 0.1, 0.33 and 5 μM B). The wheat and barley genotypes were selected to cover a whole range of response to B, from very inefficient to efficient. No effect of B was found on vegetative growth in all three wheat genotypes, except that Tatiara had more tillers in B0 and B0.1 than in higher B. In barley, B deficiency enhanced the number of tiller in BRB 9 but not in the other two barley genotypes. The effect of B deficiency on grain set was much more variable among the wheat genotypes than in the barley. In B0, Fang 60 had almost as many grains as in higher B, whereas, the grain set index (GSI) of SW 41 was 67%, Tatiara was 0.2%, and the three barley genotypes
ranged from 12% to 32%. Increasing B increased the GSI in the three barley genotypes as well as the SW 41 and Tatiara wheat.

At B0, ear boron concentration at full boot stage was 8.53, 7.78 and 4.89 mg B/kg in Fang 60, SW 41 and Tatiara respectively. The GSI and B concentration of Tatiara were lowest at B0. Boron concentration in the ear did not differ between Fang 60 and SW 41 although Fang 60 had higher GSI than SW 41. It is possible that Fang 60 may be better able to supply B to its reproductive development than SW 41. Boron concentration in the flag leaf in B0 was found to be 9.28, 7.50 and 3.79 mg B/kg for Fang 60, SW 41 and Tatiara, respectively. Ear B concentration in the barley were found to be 6.61, 9.34 and 4.59 mg B/kg in BRB 9, BCMU 96-9 and CMBL 92029 respectively. CMBL 92029 had lowest B concentration and GSI was 12.5% whereas BCMU 96-9 was highest ear B concentration but its GSI was lower than BRB 9. Flag leaf B concentration in BRB 9 was higher than CMBL 92029 and BCMU 96-9. Increasing B supply increased B accumulation all of genotypes. The GSI was closely related to boron concentration in the ear and flag leaf of Tatiara, and also ears B concentration in the case of CMBL 92029. Except Tatiara and CMBL 92029 genotypes. In other genotypes, the B concentration in the ear and flag leaf were not related with the GSI.

The second experiment compared wheat (SW 41) and barley (BRB 9) at two levels of added B (0 and 10 μM B). It was found that wheat and barley differed in the response to low B. The levels of B had no effect on vegetative growth of wheat. In barley, in contrast, at the lower B level the development rate was slower and the number of spikelets spike⁻¹ were depressed and tillering and dry weight tended to be increased. The effect of B deficiency in B0 was more severe than in experiment 1, barley set only a few grains and wheat set none. Both SW41 wheat and BRB 9 barley set grain normally with B10. Without added B, at boot stage the B concentration was 4 mg B kg⁻¹ in main stem and in the flag leaf, with no significant difference between species. In each B level, the ear and flag leaf B concentration of main stem and tillers was not different at the similar stage. Accumulation B concentration was increased when was increasing B.

From these experiments it may be concluded that B deficiency adversely affected vegetative growth and delayed reproductive development only in barley and not in wheat. Tissue B analysis could not distinguish differences in B efficiency between wheat and barley or among the genotypes of each species.