Abstract

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Responses of barley genotypes and their F_1 hybrids to boron deficiency were studied at the Faculty of Agriculture, Chiang Mai University. Two experiments were carried out in the 1998/1999 and 1999/2000 seasons. In the first experiment, genotypic variation in response of barley to boron levels was evaluated on a low boron soil in a split plot design with three replications. The three boron levels (nil (B0), 2000 kg lime ha^{-1} (BL) and 10 kg B ha^{-1} (B+)), and six barley genotypes (BRB 9624, BRB 9, BCMU 96-9, SMGBL 94003, CMBL 92029 and Stirling) were assigned in main plot and sub plot respectively. In the second experiment, responses to boron deficiency of F_1 hybrid compare to their parents were evaluated in sand culture. This experiment was conducted with two factors arranged in a factorial design with two replications. The first factor was two levels of applied boron (0 and 10 μMB) to the nutrient solution. The second was four barley genotypes (BRB 9604, BRB 9, BCMU 96-9 and Stirling) and five F_1 hybrids that included BRB 9604 x BRB 9, BRB 9 x BRB 9604, BRB 9 x BCMU 96-9, BCMU 96-9 x BRB 9 and BRB 9604 x Stirling.

From the first experiment it was found that barley genotypes differed in their response to boron levels in terms of number of grains $spike^{-1}$, barley grain set index

(BGSI%) and grain yield. No effect of low boron was found in BRB 9624 and BRB 9 genotypes, while grains spike^{-1} and BGSI of the other genotypes were reduced significantly when grown in low boron compared to B+. However, There was no significant difference between genotypes in terms of number of spikelets spike^{-1} and weight of 1000 seed. In the second experiment, responses to boron deficiency i. e. number of leaf, plant height, number of tillers, days to ear emergence, number of spike plant^{-1}, spikelets spike^{-1}, grains spike^{-1}, BGSI%, weight of seed and straw differed among the F_1 hybrid and their parents and among crosses. Similarity in the response to boron between F_1 from reciprocal crosses indicated that responsible gene (s) was in the nucleus. Expression of responses to boron levels in F_1 hybrids was controlled by gene actions ranging from incomplete dominance to complete dominance depending on the parents and boron levels.

In conclusion, genotypic variation of the response to boron deficiency of barley has been found. I also found evidence that boron efficiency was genetically controlled so can be transmitted to the progeny. It is therefore possible to include boron efficiency as an objective of breeding programs.