2.1.6 Manda, Peter J. (2009). The response of green beans (*Phaseolus vulgaris* L.) to varying application rates of boron. (Supervisors: Dr. B. H. Chishala and Dr. O. A. Yerokun).

Green bean (*Phaseolus vulgaris*) is a very important crop, feeding a large number of people in the world. However, bean yields are low; hence any method resulting in increased green bean yield may be of great importance. Boron (B) is one of the most important micronutrients necessary for bean growth and yield. A widespread deficiency of boron (B) has been reported in Zambian soils. This is a limitation to the potential yield of green beans, therefore, additions of B to the crop could contribute to higher yields. Currently, the University of Zambia recommends the addition of up to 2 kg /ha B as a way of addressing boron deficiency in most crops grown. It is not well known, however, whether increasing supply rates of B applied would make a difference in yield. A study was carried out to correlate two methods of boron analysis with plant

B uptake, and to determine whether B fertilizer application would improve crop performance. The hypothesis of this research was that since B is often deficient in soil, soil and foliar application of B ought to increase green bean yield. In the laboratory, 16 soils that included pairs from cropped and fallow land were extracted for B using hot-water extraction and acid extraction. A parallel study was carried out in the green house. A green bean crop was grown in each of the soils for a six week period. In the field, five rates of B were applied at 0, 2, 4, 6 and 8 kg/ha, to two green beans crops. One foliar application at 0.45g/l was also used as one of the treatments giving a total of 6 treatments. The field experiments were conducted at York Farm in Lusaka Province in Zambia while the pot experiment was conducted in the greenhouse at the University of Zambia. Extractable B values were obtained in the laboratory, and B uptake in the green house. In the field, plant height, pod length, packout rate and yield were obtained. Results indicated that there was no good correlation between each of the two extraction methods with plant uptake. Foliar application of B at 0.45 g/l also did not significantly increase bean yield. The results also showed that in both field and green house experiments increasing rates of B did not influence ($P \leq 0.05$) plant height, pod length, yield and quality of green beans. The early crop which was grown purely on drip irrigation did slightly better than the second crop which received some rainfall. During the first crop, the pods were 6 % longer than the control compared to only 1 % in the second crop. The length of pod was found to be strongly related to yield increase of green beans. The yields were 28 % more than the control in the first crop and 15.6 % more in the second crop. The fruit quality was not affected by increasing rates of B. However. higher packout rates were obtained in the first crop compared to the second. These preliminary results suggest that green bean yields and quality may be better when grown in winter season. Soil application of B was more effective than foliar application in the greenhouse while the opposite was true in the field trial.