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RESEARCH PAPER

Critical level of hot water soluble boron for predicting response of toria (*Brassica compestris*) in alluvial soils of Punjab

S.S. DHALIWAL*, U.S. SADANA AND J.S. MANCHANDA
Department of Soil Science, Punjab Agricultural University, LUDHIANA (PUNJAB) INDIA
(Email : drdhaliwalss@yahoo.com)

Abstract **:** A screenhouse investigation was conducted on 20 soils to determine the critical deficiency limit of B in *Entisols* and *Inceptisols* for predicting response of toria with cultivar TL 15 to B application. Field investigation was also conducted at research farm area of Department of Soils, PAU, Ludhiana to confirm these results under field conditions. The soils selected for this study were having a wide range of hot water soluble boron (HWS-B), varying from 0.10 - 1.70 mg kg^{-1} soil. Depending upon response of toria to applied B, nine soils out of 20 were classified as B deficient whereas, eleven were grouped into B sufficient range. The results of our study predicted that HWS- B was significantly related with Bray's per cent dry matter yield. Soil application of B @ 0.44 mg kg^{-1} soil significantly increased the dry matter yield of toria over control and with application of B @ 0.22 and 0.88 mg kg^{-1} soil. However, increase in dry matter yield was not significant with increase in concentration of B beyond 0.44 mg kg^{-1}. Both statistical and graphical models of Cate and Nelson technique were employed for analysis of data which indicated that the critical level to be 0.51 mg kg^{-1} soil of HWS-B for prediction of B deficiency in the soils for toria crop. On the other hand the critical deficiency level in toria of 45 days toria plants was 29.2 mg kg^{-1}. The predictability of soil and plant critical limit for B was 94 per cent. These results were also confirmed in the field experiment which reported the equivalent results and similar response of toria crop to applied B @ 1.0 kg ha^{-1}.

Key Words **:** Critical level, Green house experiment, Hot water soluble boron

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INTRODUCTION

Among different plant nutrients, boron (B) is an essential element for agricultural crops production and the major role of B in plants is the control of the membrane functions (Dale and Krystyna, 1994). The deficiency of B in agricultural crops especially toria (*Brassica compestris*) can lead to disorders in plant community which further leads to serious health problems. World production of toria has increased very rapidly over the last 20 years. Though, B deficiency is more prevalent on acid soils high in Fe and Mn oxides and on soils receiving high rainfall (Brown *et al.*, 2002) it may also appear in crops grown in alkaline soils where B becomes unavailable to plants. Toria cultivated in India 3000 years ago and it was introduced to China and Japan, about 500 to 200 BC (Krzymanski, 1998). The average yield of oilseed toria depends on a large number of factors such as climate of the area, soil fertility status, and intensity of production, fertilizer input, B content of soil and variety of toria cultivar. The average yields of toria shows a wide range from country to country. India is also an important producer of oilseed toria accounting for as much as 14 per cent of world production.

Boron deficiency symptoms in plants:

Boron plays a pivotal role in cell wall biosynthesis and in regulating membrane permeability, tissue differentiation, carbohydrate and protein metabolism, cell division and cell

*** Author for correspondence.**