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In vitro screening of three beet (*beta vulgaris*) varieties adaptable to low nitrogen levels

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Abstract
Beet (*Beta vulgaris*) is a cool-season vegetable grown in Kalpitiya. The area consists of sandy Regosol soil and due to the high permeability, and high evaporation rates the agricultural lands in this region require frequent heavy irrigation. Consequently, the crops need to be applied with high fertilizer doses frequently to compensate for the leachate with irrigation water. It causes a gradual accumulation of nitrogen in groundwater that has already reached alarming levels causing health concerns. Cultivation of crops adaptable to low nitrogen levels is a long-term sustainable approach to overcome this problem. Hence, the present study was conducted to screen three commercially grown beet varieties for their adaptability to low nitrogen supplements under *in vitro* conditions. A factorial experiment was conducted in a completely randomized design with three varieties (Chariot, Ruby Queen and Red Ace) and four Nitrogen levels supplemented through altered concentrations of NH_4NO_3 [875 (control), 656.25, 437.5 and 218.75 mg/L] in the MS Medium using 30 seedlings. Seedling characteristics including the number of leaves, number of roots, shoot dry weight root dry weight were recorded at the end of 30 days of subculturing the two leaved seedlings onto the media containing four nitrogen levels. The data were subjected to Analysis of Variance using R statistical package. An interaction effect was not observed in the tested parameters. A significant difference was not observed among the four nitrogen levels for the number of roots, shoot and root dry weight in all three varieties whereas the number of leaves was affected by the nitrogen level in all three varieties. In Chariot, a significant increase was observed in the number of leaves in the media containing 656.25 and 437.5 mg/L compared to the lowest level 218.75 mg/L. However, the lowest level was comparable to the control whereas in Ruby Queen and Red Ace a significant reduction was observed at the lowest level compared to the control. Therefore, the variety Chariot was identified as the most potential variety that is adaptable for cultivating soils with reduced nitrogen, compared to the other two varieties tested. Further study is required to estimate the actual performance of the identified varieties under *in vivo* conditions.

Keywords: Beet (*Beta vulgaris*), *In vitro* screening, Kalpitiya, Nitrogen use efficiency

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