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**Selection of drought-tolerant chili (*Capsicum annuum* L.) varieties for Kalpitiya peninsula using *in-vitro* techniques**

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**Abstract**

Chili is one of the major crops grown in Kalpitiya peninsula which belongs to the North Western Province in Sri Lanka which has a year-round drought conditions. The major constraint for chili cultivation in Kalpitiya is water stress due to water deficit and high temperature. Farmers tend to apply intensive irrigation methods for overcoming water and heat stress and large amounts of nitrogen fertilizer to compensate for the leachate through irrigation water due to the sandy nature of the soil. It leads to extensive contamination of the groundwater table. One of the potential strategies to overcome this problem is the cultivation of the chili varieties more adaptable to the drought condition. This study was carried out to screen drought-tolerant chili varieties suitable for cultivating in the Kalpitiya area that was done through *in-vitro* selection by using an artificial stress inducer, Polyethylene glycol 6000 (PEG 6000). In the factorial experiment in the Completely Randomized Design, three chili varieties (Galkiriyagama selection, MICH HY 2, Vijaya F1) were screened using half-strength Murashige and Skoog medium supplemented with four PEG levels, 0, 20, 40 and 60 g/L using 30 seedlings containing two leaves. After 30 days of subculturing, early vegetative growth parameters; the number of leaves, number of roots, shoot dry weight and root dry weight were recorded and subjected to Analysis of Variance. A significant effect of artificial drought was observed for the number of leaves ( $p < 0.0001$ ). Furthermore, a significant difference was observed among the varieties for all parameters ( $p < 0.0001$ ), thus can be used for screening purposes. Galkiriyagama selection showed a significant reduction in all parameters at the 60 mg/L except for shoot dry weight where a comparable performance was observed. Vijaya F1 showed a comparable performance for all parameters except for number of roots with a significant decrease at the highest PEG level. MICH HY 2 showed either a comparable or increased performance for all parameters thus shows a higher potential for tolerance to the drought condition. However, further studies are required for selecting best drought-tolerant chili varieties for cultivating in Kalpitiya area.

**Keywords:** *Capsicum annuum* L., Kalpitiya, Polyethylene glycol, Water stress

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