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Evaluating Shoot Performance of Vertical and Horizontal Placement of Insulin (*Costus igneus*) Stem Cuttings Grown in Soil with Tea Waste and Cattle Manure

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Abstract

Costus igneus (Insulin plant) is a member of the Costaceae family of medicinal herbs which has the ability to help the body produce more insulin. This plant is vegetatively propagated by using stem cuttings. An experiment was carried out at Gonawala in Gampaha district, Sri Lanka to study the impact of tea waste and cattle manure on the shoot performance of insulin stem cuttings and also to evaluate their efficiency on vertical and horizontal orientational placement of cuttings. It was arranged in a completely randomized design with eight treatments. Each treatment had three replications, and this experiment was repeated twice. Poly Bags were filled with only soil (T1, T5), soil + tea waste at 1:1 ratio (T2, T6), soil + cattle manure at 1:1 ratio (T3, T7) and soil + tea waste + cattle manure at 2:1:1 ratio (T4, T8) as potting media. Subsequently semi-hard stem cuttings approximately 5 cm in length with single nodes were placed horizontally in T1-T4 and vertically in T5-T8 treatments. Leaf length and width, number of leaves and newly developed shoot length were taken at 8th week after planting of the cuttings. The data collected were analyzed by analysis of variance using SAS software application. The results showed that there were significant variations ($P<0.01$) in the leaf number and shoot length among the treatments and T4 had significantly higher leaf number (10.3) compared to the other treatments except T8. The highest shoot length was observed in T4 (9.5 cm) and the lowest length was indicated by T1 (6.5 cm). In horizontal placement of cuttings (T1-T4), shoots were developed from cuttings within the first two weeks but in vertical position, (T5-T8), it took nearly four weeks to develop the shoot. According to the marked values, there was a significant variation ($P<0.001$) in the length of 1st and 2nd leaves among the treatments. The highest and lowest length of 1st and 2nd leaves resulted in T4 and T5 respectively. However, there was no significant difference ($P>0.05$) in the width of 1st and 2nd leaves. The combination of locally available tea waste and cattle manure had the greatest effect on the formation of shoots from the insulin stem cuttings. In horizontally placed cuttings, shoots were induced quicker than the cuttings placed vertically. This may be due to horizontal cuttings exposing a larger surface area to the soil than the vertical placement of cuttings. The findings showed that stem cuttings can be placed horizontally in a potting medium containing locally available household tea waste and cattle manure for the effective plant propagation of *Costus igneus*.

Keywords: *Costus igneus* propagation, Tea waste, Cattle manure, Horizontal and vertical placement