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Anatomy and chromium tolerance of green leafy vegetable, *Alternanthera sessilis* and its sympatric weed, *Alternanthera philoxeroides*

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Heavy metals can be readily taken up by crop roots and can be accumulated at high levels in edible parts. Elevated levels of heavy metal in edible parts of vegetables can affect human health. Some food plants in Sri Lanka act as hyper-accumulators. *Alternanthera sessilis* (“Mukunuwenna”) is a commonly used leafy vegetable and its co-species *Alternanthera philoxeroides* (“Alligator weed”) is a weed and known as hyper-accumulators. *A. sessilis* bunches available in vegetable markets are commonly mixed with *A. philoxeroides*. Chromium (Cr) is a heavy metal and its maximum allowable limit in food is 2.3 mg/kg (FAO/WHO). The objectives of the present study were to determine the ability to tolerate chromium in *A. sessilis* and *A. philoxeroides* and their anatomical variations. Pot experiments were done by growing healthy plantlets of both *Alternanthera* species in garden soil treated with Cr concentrations of 0, 10, 15, 20, 30 and 40 mg/kg. 30 pots per treatment were used and three plants were planted in each pot. Growth parameters of plants were measured after two weeks. All the data obtained were statistically analyzed using MINITAB (Version-18) statistical software package. The one way analysis of variance (ANOVA, $p < 0.05$), Tukey’s pairwise comparison tests was employed to make out the significant differences. While *A. philoxeroides* bear hollow cylinder in their stems, *A. sessilis* stems are filled with pith cells. In leaves, clustered vascular bundles are seen in *A. philoxeroides*, whereas single isolated vascular bundles are seen in *A. sessilis*. While the highest shoot height and fresh weight of *A. sessilis* were at 15 mg/kg Cr concentration, that of *A. philoxeroides* were recorded at 20 mg/kg Cr treatment. In *A. philoxeroides*, the highest internode length was recorded at the 20 mg/kg of Cr treatment. But, in *A. Sessilis*, the highest internode length was recorded in the control. Although the plant growth of two *Alternanthera* species was increased with increasing Cr in soil, above 40 mg/kg of Cr caused growth reduction in both species. While chlorosis of the plants was recorded in *A. sessilis*, wilting of plants were observed in *A. philoxeroides* at 40 mg/kg of Cr concentrations. Interestingly, *A. philoxeroides* showed a higher level of Cr tolerance without a considerable growth reduction compared to *A. sessilis*. As *A. philoxeroides* grows healthier than *A. sessilis* in an environment with high levels of Cr, it may be of health risk if *A. philoxeroides* is being consumed due to the possibility of accumulated Cr.

Keywords: *Alternanthera philoxeroides*, *Alternanthera sessilis*, anatomy, chromium tolerance