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Soil nutrient contents in the Ussangoda serpentine soil

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Serpentine soils result from weathering of ultramafic rocks which contain high concentrations of Fe, Mg and Si. These soils are deficient in plant nutrients such as N, P, K and Ca. In addition, Mg, Fe and Ni occur in high concentrations. The ratio of Ca to Mg is <0.7 in serpentine soils, which is an important parameter to distinguish these from non-serpentine soils. Serpentine soils are sandy, shallow and well drained containing very low moisture. In addition they have a poor soil structure. All these factors present a hostile environment to plant life. This study is an attempt to assess the plant available elements at this site.

Ussangoda is one of the five serpentine sites in Sri Lanka, located on the southern coast of the island. The soil of this site is red in colour and has a plain area of 1 km^2 with a few interspersed islands of vegetation. The plain area consists of prostrate plants and the islands contain shrubs. The highest point is 34.5 m from sea level. Soil samples were collected according to the stratified random sampling technique representing three contours (10-20 m, 20-30 m and above 30 m) at a depth of 10 cm below the soil surface where most of the roots were present. Plant available micro-elements (DTPA method) and macro-elements (ammonium acetate method) were determined using the Atomic Absorption Spectrophotometer. The results were analyzed using one way ANOVA.

The available micro-elements, Fe and Mn were low at the higher elevation (69 µg/g and 27 µg/g respectively) than at the lower elevation (82 µg/g and 45 µg/g respectively). The other available micro-elements, Cu and Zn were detected at less than 2 µg/g. The macro-elements, Ca, Mg and K showed high variability. However the obtained result for Ca was significantly lower in the plains in comparison to the non serpentine areas (p=0.000). The Ca/Mg was less than 0.7 in the serpentine site and above 3 in non-serpentine. In addition, available Ni (non-essential element) was significantly higher (p=0.001) in the serpentine site in contrast to the non serpentine sites. Our preliminary results show that the Ussangoda serpentine site has the major characteristics of a typical serpentine soil (Ca/Mg ratio, presence of high Ni) and other features of its own.

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