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Comparison of some physical and chemical properties of soils under different aged Teak plantations in Kadjuwatte with other sites having healthy growth of Teak in Mahaweli System C, Sri Lanka

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Abstract

Soil is one of the most important natural resources for crop production. Plants require soil to obtain water and nutrients for growth and for anchorage and stability. According to published records, among many factors controlling the distribution and growth performance of Teak (*Tectona grandis*) are edaphic factors including depth, drainage, texture, moisture status and fertility of both surface and subsurface soils. There is a marked relationship between mineral nutrition of soil and growth of Teak.

The study was initiated with the objective of finding the contribution of edaphic conditions on the growth performance of Teak grown in Kadjuwatte, an estate located in Dehiattakandiya, Mahaweli System C belonging to Informatics Agrotech Pvt. Ltd. The total extent of the Estate is 1646 acres and the Teak plantations with the ages ranging from 8 to 18 are spread over 200 ha in the entire Estate. Trees in general show suboptimal performance compared with the reported growth for other parts of Sri Lanka and countries with similar climates. Further, it was also observed that the growth of Teak located in the same District shows better performance compared to the Teak in Kadjuwatte.

Three soil samples were taken up to a depth of 45 cm from each block in both Kadjuwatte and the Teak Plantations in Polonnaruwa District. These samples were analysed for both physical and chemical parameters such as soil pH, texture, organic matter, cation exchange capacity, nitrate nitrogen, available phosphorus, potassium, calcium and magnesium. Soil profiles were also made in the plantations in Kadjuwatte and other Teak plantations in the Polonnaruwa District.

The results revealed that significant differences ($p>0.05$) were observed in both physical and chemical properties of soil in plantations in Kadjuwatte compared with the other Teak Plantations in the Polonnaruwa District. Soil pH, Phosphorus, nitrate nitrogen was significantly lower in the soil in Kadjuwatte. pH, Organic matter, Phosphorus, Potassium showed variations between ages even in the same plantation. About 25cm thick hard pan has been identified in soil profile of Kadjuwatte plantation which was absent in other healthy plantations of Teak taken for the comparison.

Therefore it can be concluded that both physical and chemical parameters as well as the effective soil depth for tree growth had shown significant impact on the growth of Teak. Fertilisation will help to improve the growth of existing Teak plantations in the Kadjuwatte while planting in locations without hard pan will facilitate growth in the future.

Key words: Teak, soil