A TECHNIQUE FOR STUDYING NUTRIENT DYNAMICS IN THE SOIL-ROOT INTERFACE OF FOREST TREE SPECIES

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Numerous development programmes are in operation for safeguarding the existing natural forests and replanting of man-made forest plantations in the country. In this context, detailed research studies on forest plant species and soils play a dominant role. However little or no published information is available on the studies of nutrient needs and their behavior in Sri Lankan forest soils. Unlike natural forest eco-systems, commercial felling of tree species in man-made forests could remove considerable amount of nutrients from the soil and if logging is continued without replenishing the depleted nutrients to the soil, it may cause severe consequences on the growth of forest species in the future.

The knowledge on nutrient dynamics in the soil-root interface is important in understanding and estimating nutrient demands of plant species because the conditions at the soil-root interface (rhizosphere) are considerably different from, and influence plant growth more, than those at a distance from the roots. For this reason, many researchers have been interested in studying the characteristics of the rhizosphere, relative to those of the bulk soil. The rhizosphere is a narrow soil cylinder (about 0-2 mm radius) surrounding the root and therefore, it is technically difficult to study the root induced chemical changes in this zone. One problem is the small amount of rhizosphere soil available for chemical analysis and another is the determination of the line of demarcation between rhizosphere and the bulk soil. Nevertheless much less is known about the rhizosphere process in tree crops especially in the field due to absences of a dependable method for sampling thin sections of rhizosphere soil.

The Rhizosphere Study Container (RSC) technique developed for annual crops was modified to study the rhizosphere processes in *Camellias* and tea plants under glasshouse and field conditions. The modified RSC is a two-component device, made-up of two (PVC) cylinders, the upper compartment having an internal diameter of 82 mm and 25 mm depth and the lower compartment having an internal diameter of 74 mm and 50 mm depth. The two compartments were separated by a 24 μm pore diameter polyester mesh. Both compartments are filled with soil and plant roots were allowed to grow

in the upper compartment and the roots striking the polyester mesh were unable to penetrate the mesh and therefore grew horizontally along the mesh forming a root mat. The soil below the mesh therefore represents the rhizosphere and the zone of transition demarcating the bulk soil. Thin sections of rhizosphere soil at various distances from the mesh (rhizoplane) could be sliced using a piston microtome and chemically analyze to determine root induced chemical changes. Studies showed marked differences in soil pH, Phosphorous depletion patterns and differences in phosphate rock dissolution around fine roots of *Camellias* and tea. This paper makes an attempt to emphasize the use of modified RSC technique in studying rhizosphere process in forest trees.