Falcataria moluccana (Miq.) root distribution seedlings in response to nitrogen concentrations and tillage

ABSTRACT

Falcataria moluccana (Miq.) Barnaby & Grimes is an important species for forest plantation programmes in Malaysia and is widely used in the wood industry. However, its root interactions have not been widely investigated due to the limited methodologies and information about the root distribution of trees and crops in forest plantation and agroforestry systems. This study was conducted to determine the rhizotron-scale root interactions of F. moluccana at different tillage and nitrogen concentrations under four different treatments: control, tillage, fertiliser, and tillage with fertiliser. The rhizotron-scale experiment was conducted at a greenhouse where F. moluccana (Batai) seedlings were transplanted in transparent rhizotron tubes (onemetre-high transparent polycarbonate solid sheet) using topsoil and river sand to simulate natural growing conditions. Root Intensity (RI), Root Length Density (RLD), Specific Root Length (SRL), dried shoot biomass and root biomass were recorded. Root biomass and SRL were notably higher (25–50 cm depth) at 6 WAT (Weeks After Transplanting), and the shoot biomass (tillage + fertiliser) was significantly higher at 14 WAT. However, plants treated with different tillage and nitrogen concentrations showed no significant impact on the RI and RLD. Fertiliser treatment only, and tillage with fertiliser treatment, showed greater root distribution at the rhizotron scale. These findings contribute to forest plantation and natural forest rehabilitation efforts by helping optimise the soil resources within ecosystems for sustainable forest management.