


Canopy management practices in mulberry: impact on fine and coarse roots

R. Kaushal  · J. Jayaparkash · D. Mandal · Ambrish Kumar ·
N. M. Alam · J. M. S. Tomar · H. Mehta · O. P. Chaturvedi

Received: 7 November 2016 / Accepted: 22 October 2017
© Springer Science+Business Media B.V. 2017

Abstract Canopy management practices viz. lopping, pruning, coppicing and pollarding in trees alter branch density, height, leaf area index and rooting pattern of the trees. The present study was conducted to quantify the impact of canopy management practices and intercropping on fine and coarse roots distribution in mulberry (*Morus alba*). In total, six treatments comprising of three management practices (pollarding, coppicing and lopping) and two cropping situations (intercropping and without intercropping) were evaluated. Vertical and lateral distribution of fine root biomass (FRB) was recorded through sequential core method in different seasons. Coarse root distribution and biomass was studied using excavation method. Results revealed that canopy management treatments viz., coppicing and pollarding reduced the FRB as compared to lopping treatment in both intercropped and non-intercropped situation. Results also revealed that majority of the fine root biomass (67.3%) was confined in 0–15 cm soil layer. All the canopy management treatments under non-intercropped plots showed higher production rate as

compared to intercropped plots. Fine root turnover rate (yr^{-1}) was highest (0.592) in lopping treatment in non-intercropped plots whereas, the minimum turnover rate was recorded in coppicing treatment (0.331) in non-intercropped plots. Coarse root biomass was highest in case of intercropped plots in all the three canopy management treatments. Pollarding + turmeric cultivation showed the maximum root biomass followed by lopping + turmeric intercropping treatment. The main and primary roots in all the treatments accounted for > 70% biomass except for coppicing + turmeric treatment, whereas secondary and tertiary roots contributed about 40% biomass. All the treatments showed a pronounced decrease in root biomass with increasing soil depth and 75–84% of the total root biomass (main + lateral roots) was allocated in the top 30 cm of the soil profile. From the study, it can be concluded that tree management practices have direct impact on fine and coarse root distribution and should be judiciously used for avoiding competition in intercropping situation.

Keywords Biomass · Canopy management · Coarse roots · Coppicing · Fine roots · Lopping · *Morus alba* · Pollarding turnover