研究论文

川西山地主要人工林种群根系生物量与生产力

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摘要　　采用标准地法，对四川西部山地主要人工林的根系进行了研究，结果表明：（1）用D2H估测单株林木根系生物量的适合模型均以幂函数模型为最佳，所筛选统计模型的相关系数较高，在0.94～0.99之间；（2）根系总生物量大小排序为日本落叶松>峨眉冷杉>四川红杉>川西云杉，分别为37.832、24.907、18.320t/hm2和15.982 t/hm^2，各级根的生物量占总根量的比例各不相同；（3）根系生物量集中分布土层0.00～40.00cm，川西云杉占97.88%，四川红杉占96.78%，峨眉冷杉占95.65%，日本落叶松占99.72%；尤其在0.00～20.00cm土层分布的根最多，分别占77.13%，77.13%，65.02%和80.66%；在0.00～20.00cm，20.00～40.00cm和40.00～60.00cm的各层根系生物量分配比例，川西云杉为34：12：1，四川红杉为24：6：1，峨眉冷杉为15：7：1，日本落叶松为63：14：1；（4）川西云杉、四川红杉、峨眉冷杉和日本落叶松人工林种群根系的生物量密度分别为10.782t/(hm^2•m)，8.230 t/(hm^2•m)，14.546 t/(hm^2•m)和13.211 t/(hm^2•m)；（5）川西云杉、四川红杉、峨眉冷杉和日本落叶松人工林种群根系生产力分别为0.57、0.83、0.71t/(hm^2•a)和1.64 t/(hm^2•a)。

关键词　　川西云杉；四川红杉；峨眉冷杉；日本落叶松；生物量密度；净生产量；生产力
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Studies on root biomass and productivity in dominant plantation populations in the mountainous land in western Scihuan

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Abstract This study investigated root biomass and productivity in dominant plantation populations in western Sichuan, China. A total of 4 plots (*Picea balfouriana* plantation population for 28 age in Maerkang, 9 trees, mean DBH of population for 10.4 cm and height for 10.5m; *Larix maxteriana* plantation for 22 age in Wolong, 9 trees, mean DBH of population for 17.0cm and height for 13.8 m; Abies fabri plantation for 35 age in Ebian, 18 trees, mean DBH of population for 14.1cm and height for 11.9m; *Larix kaempferi* plantation for 23 age in Miyaluo, 8 trees, mean DBH of population for 17.4 cm and height for 14.5m; a 20 m×25 m plot located on each of the 4 types in western Sichuan, China) were randomly selected and excavated to a depth of 60cm for each of the 4 plantation population types. To estimate the root biomass of an individual tree using D2H, an exponential model was selected with the highest coefficient ranging from 0.94 to 0.99. The tota

l root biomass per hm2 varied among plantation population types following the order: Larix kaempferi (37.832 t/hm2)>Abies fabri(24.907t/hm^2)>Larix maxteriana(18.320 t/hm^2)>Picea balfouriana population(15.982t/hm2). The biomass fractions of a given root size class compared to the total root biomass differed among plantation population types. For all 4 studied plantation types, the majority of the roots were distributed in the top 40 cm of soil, e.g. 97.88% for Picea balfouriana population, 96.78% for Larix maxteriana, 95.65% for Abies fabri, and 99.72% for Larix kaempferi population. The root biomass fractions distributed in the top 20 cm of soil were 77.13% for Picea balfouriana，77.13% for Larix maxteriana，65.02% for Abies fabri and 80.66% for Larix kaempferi, respectively. The root allocation in the 0～20, 20～40, and 40～60 cm soil layers gave ratios of 34：12：1 for Picea balfouriana, 24：6：1 for Larix maxteriana, 15：7：1 for Abies fabri, and 64：4：1 for Larix kaempferi populations. The root biomass density of dominant plantation population was 10.782 t/(hm^2•m) (for Picea balfouriana)，8.230 t/(hm^2•m)(for Larix maxteriana)，14.546 t/(hm^2•m) (for Larix maxteriana),，13.211 t/(hm^2•m) (Larix kaempferi population), respectively. The root biomass productivity was found to be 0.57 t/(hm^2•a) (for Picea balfouriana), 0.83 t/(hm^2•a) (for Larix maxteriana), 0.71 t/(hm2•a) (for Abies fabric) and 1.64 t/(hm^2•a) (Larix kaempferi population), respectively.

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