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研究论文

塔里木河上、中游胡杨种群结构与统计分析

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摘要 在新疆塔里木河的上游-阿瓦提县和中游-轮台县胡杨林自然保护区内设置1.2hm2的样地，应用相邻格子法进行每木调查获取野外资料，编绘了不同生境胡杨种群的特定时间生命表、存活曲线和大小、年龄结构图。结果表明：不同生境胡杨的种群结构差异明显。阿瓦提县胡杨种群大小、年龄结构呈金字塔型，幼苗储备丰富，缺乏老树，林分较年轻，为增长种群。种群从Ⅰ～Ⅱ级发育过程中死亡率较高，中龄个体生命期望寿命较高，存活曲线符合DeeveyⅢ（凹）型。轮台县胡杨种群大小、年龄结构呈中部大、两端小的正态分布，幼苗相对较少，林相成熟，为稳定种群。种群从Ⅵ～Ⅶ级发育过程中死亡率较高，生命期望寿命随年龄的增大而降低，存活曲线经模型检验符合DeeveyII（直线）型。不同生境种群的消失率与死亡率曲线变化一致，均出现两个高峰，峰值大小明显不同。种群数量动态是胡杨生物学特性和环境条件共同作用的结果。

关键词 塔里木河 胡杨 种群结构 特定时间生命表 存活曲线

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Population structure and demography of Populus euphratica in upper and middle reaches of Tarim River

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Abstract Desert *Populus euphratica* forest widely distributes in an arid desert region(30°-50° N),its dominated species are *Salicaceae* and *Tamaricaceae*. The typical *P.euphratica* forest exists in Tarim River Basin, also occupys over 350,000 km2 and 90% of total *P.euphratica* area in china. The existence and development of desert *P.euphratica* has great ecological, economical and social benefits, and controls the structure、 function and sustainable development of Tarim desert ecosystem. Since 1960s soil and water resources of upper and middle reaches of the Tarim River were excessively exploited, which induced to recession, nonbearing trees and death of large area *P.euphratica* forest, and directly damaged sustainable development of oasis agriculture and ecological balance. This objective of this study was to illuminate the population structure and quantitative dynamic, living status and development trend in the future, and provides theoretical base for utilizing resources rationally and protecting dominant population. The original desert forest and the center zone are located in Nature Reserve Region of Awati and Luntai county in upper and middle reaches of Tarim River, the environmental conditions of Awati county are good and the groundwater level is shallow, *P.euphratica* grows well. On the contrary, Luntai county has extremely poor conditions for *P.euphratica* growth. The research plots were selected in Awati(80°25′E,39°40′N) and Luntai (84°15′E,41°09′N)county. The 1.2hm2 plot was investigated in 2005, and was divided into 480 subplots. All the trees whose stems are over 2.5 cm in DBH were identified, measured, tagged, and mapped.The time-specific life table was created for species, and the survivorship curve, size and age structure were analyzed with field data in this paper. The results showed the size and age structure characteristics of different *P.euphratica* population were obvious

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ly different in the two study sites.The size and age structure of *P.euphraticu* population in Awat i county showed positive pyramidal type, indicating that it had rich saplings banks and regenerate d well, it is progressive population. The expected average life of middle age trees was high, and th e survivorship curve of the population conformed to the type of Deevey III. The size and age stru cture of *P.euphraticu* population in Luntai county showed approximate normal distribution, it ha d a lot of sprout seedlings and grew feeble. It indicated that population kept stability currently. Th e expected average life decreased with age increasing, and the survivorship curve of the populatio n conformed to the type of Deevey II. The Killing power and mortality rate curve of two differen t populations had obviously different. There were two peaks of mortality rate and killing power o f Awtai county population in the lifespan, one was from seedlings to young trees(0-20 years)and t he other in the adult stage(80-100 years). It was supposed to result from the inter-and intra-speci fic competition. In Luntai county, one peak was middle age stage(100-120 years), and the other i n the old stage(160-180 years). It was supposed to result from deteriorative habitat and physiolo gical decline. It is suggested that quantitative dynamics of population is impacted by environmenta l factors and biological characteristic of *P.euphraticu*

Key words Tarim River _ *Populus* *euphraticu* _ population structure _ time-s pecific life table _ survivorship curve

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