

研究论文

西藏色季拉山林线冷杉种群结构与动态

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摘要 急尖长苞冷杉 (*Abies georgei* var. *smithii*) 是西藏东南部地区高山林线森林群落的主要建群树种, 主要分布在色季拉山海拔3600~4400m区域, 并成为阴坡高山林线的优势树种。通过对色季拉山林线群落交错区域的定位调查, 分析了急尖长苞冷杉的个体生长、种群结构与动态以及林线特征。分析结果表明: (1) 西藏色季拉山海拔4320m处为森林郁闭上限, 该区域存在两种类型的高山林线, 阳坡为渐变型林线, 林线树种为方枝柏 (*Sabina saltuaria*); 阴坡为急变型林线, 林线树种为急尖长苞冷杉。阳坡与阴坡林线分布海拔上限分别为4570m和4390m, 阳坡高于阴坡180m; 阳坡与阴坡林线群落交错区垂直宽度分别为250m和70m, 阳坡比阴坡宽180m。(2) 阴坡海拔3700~3800m属急尖长苞冷杉分布的最适范围, 种群径级结构表现为典型的反“J”型, 种群密度约380株/hm²; 种群年龄结构表现为“金字塔”型, 属于扩展型种群。(3) 静态生命表和种群存活曲线反映了急尖长苞冷杉种群在形成初期的20a和生长发育的60~160a分别经历了强烈的环境筛选和竞争自疏, 以及后期与环境变化相关的死亡波动, 200a左右为急尖长苞冷杉的生理寿命, 种群后期基本稳定, 400a左右为极限寿命。

关键词 西藏; 急尖长苞冷杉; 林线; 种群结构; 动态

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Smith fir population structure and dynamics in the timberline ectone of the Sejila Mountain, Tibet, China

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Abstract *Abies georgei* var. *smithii*, which grows at elevations between 3600m and 4400m, is the main constructive tree species of the upper timberline in southeast of Tibet as well as the dominant species of the upper timberline on the shaded slopes. This paper presents the results of our investigation of population structure and dynamics, and timberline features of *Abies georgei* var. *smithii* populations in the transition zone of the timberline community of Mt. Sejila. The upper elevation limit of the closed forests was found to be 4320m. Two types of timberline were exhibited. On the sunny side of the mountain, the timberline exhibited a gradual change type whereas on the shaded side, there was a sharp change in timberline. The main species within these two types of timberlines were *Sabina saltuaria* and *Abies georgei* var. *smithii*, respectively. The timberline elevations on the sunny side and shaded side of the mountain were 4570m and 4390m, respectively. The respective widths of the timberlines on the sunny slope and the shaded sides were 250m and

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nd 70m. The optimal range of distribution of *Abies georgei var. smithii* populations on the shaded side was 3700-3800m. The distribution of diameter classes of the *Abies georgei var. smithii* population appeared as reverse “J shape” and its density was about 380/hm². The age structure of the population was pyramid-shape, suggesting this was an expanding population. The static life table and the survival curve showed that the populations had experienced severe environment changes and self-thinning in year 20 and years 60-100 following their establishment. They also demonstrated death fluctuation related to the environmental changes at a later stage. The physiological longevity of *Abies georgei var. smithii* was about 200 years, and its ultimate longevity was around 400 years.

Key words Smith fir; timberline ectone; population structure; dynamics

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