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雪霸自然保護區玉山圓柏永久樣區複查
及玉山圓柏健康度調查結案報告書

Resurveying the permanent sample plots and tree health assessment of
Juniperus morrisonicola Forest at the Cuei-Chih Area in Xue-ba Forest Reserve



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摘要

雪霸自然保護區位於雪山與大霸尖山之稜線以西，海拔高度在 1,100—3,886 m 之間，是臺灣地區海拔位置最高之自然生態保護區，亦為臺灣冰河遺跡最多的地方，孕育著許多珍貴動植物。區內翠池地區擁有國內少見之玉山圓柏大面積純林，在高山森林生態系中，玉山圓柏扮演著重要的角色，亦為臺灣高山地區珍貴林木，具有物種保存及水土保持的功能，本研究針對林務局東勢林區管理處於 2006 年建立之 F 永久樣區(100m × 100m)及 3 個交會帶樣區(40m × 25m)進行複查，對於 12 年間之林木變化進行分析，並於翠池旁玉山圓柏林設置 2 個健康度調查樣區(50 m × 50 m)。依調查分析結果顯示 F 永久樣區地被層植物樣區，共計調查 15 個樣區(1 m × 1 m)，其植物組成計有 14 科 21 屬 21 種(含種以下分類群)，其中包含 14 種特有種及 2 種紅皮書植物(大霸尖山酢醬草、玉山唐松草)，地被植群型可概分成川上短柄草型與髮草型 2 型；自 2006 年始，12 年間樣區中之玉山圓柏及玉山杜鵑之樹高及枝下高皆有增長的趨勢，2018 年調查結果顯示，玉山圓柏 F 永久樣區林木性狀值間，以胸高直徑與枝下高、樹高、樹冠長與樹冠比有著顯著的正相關；胸高直徑與枝下比、及枝下形狀比之性狀值間則呈現負相關，此與 2006 年所調查之結果相同，而交會帶之玉山圓柏及臺灣冷杉，其胸高直徑對樹高、枝下高及樹冠長，皆呈現正相關。

利用 TSTRAT 分層法可將 F 永久樣區之玉山圓柏區分為 10 個森林層次，樹高 15.05 m 以上之植株，於該森林群落中居於優勢之地位；F 永久樣區與交會帶樣區之樹種 12 年間無改變，林木株數則減少，但其胸高斷面積為淨增加；在空間分布方面，F 永久樣區與交會帶樣區之玉山圓柏皆呈現顯著聚集分布，臺灣冷杉則由聚集分布趨近隨機分布；樣區內之玉山圓柏與臺灣冷杉立木直徑分布及死亡林木直徑分布，屬反 J 型分布。2 個健康度調查樣區及 F 永久樣區內胸高直徑大於 20 cm 之林木健康度調查顯示，743 株林木中可區分為健康 161 株、輕微不健康 204 株、中度不健康 121 株、嚴重不健康 224 株及枯死 33 株等 5 個等級，且健康度調查樣區內之林木健康程度較 F 永久樣區為差；由調查結果推測影響玉山圓柏健康度之可能原因有二：其一由於人為活動較頻繁及

坡度較陡，經過踩踏所造成之土壤流失及根部傷害較高；其二為樣區位於東北向，可能受東北季風的強度影響而致樹冠生長受限，使玉山圓柏之樹冠生長狀況不理想。

關鍵詞：翠池、玉山圓柏、死亡、健康評估

Abstract

Xue-ba Forest Reserve is located in the west of the main crest-line between Mt. Syue and Da-ba-jian Mountain, between 1,100 and 3,886 meters above sea level. It's the highest ecological reserve in Taiwan, containing the most glacier relics and growing lots of valuable animals and plants. The Cuei-chih area within the reserve is covered with a vast pure forest of *Juniperus morrisonicola*, that is not common to see in Taiwan. In the alpine forest ecosystem, *J. morrisonicola*, the valuable and rare tree of Taiwan, plays an important role to maintain the species and conserve the soil and water. In this study, it was resurveyed to analyze the tree change in 12 years for the permanent plot F (100m × 100m) and 3 ecotone plots (40m × 25m) set in 2006 by Dongshih Forest District Office, Forestry Bureau. And 2 health assessment plots (50 m × 50 m) were set in the *J. morrisonicola* forest around Cuei-chih. The analysis result revealed that since 2006, the tree height and clear length of the *J. morrisonicola* and *Rhododendron pseudochrysanthum* in the plots have increased for these 12 years. Among the character values of the *J. morrisonicola* in the permanent plot F, the DBH had significantly positive correlations with the clear length, the tree height, the crown length, and the crown ratio. The DBH had negative correlations with the clear length to tree height ratio and the clear length to diameter ratio. It was the same with the result in 2006. As the *J. morrisonicola* and *Abies kawakamii* in the ecotone, the DBH had more positive correlations with the tree height, the clear length, and the crown length than with the other characters.

It was using TSTRAT to classify the *J. morrisonicola* in the permanent plot F into 10 strata. The individuals with the tree height above 15.05 m dominated in the community. The tree species in the permanent plot F and in the ecotone have not changed for 12 years, but the tree numbers have decreased both in the permanent plot F and in the ecotone since 2006 to 2018. However, the basal area had net increases. For the spatial distribution, the *J. morrisonicola* showed a significant aggregated

distribution in both of the permanent plot F and the ecotone plots, and the *A. kawakamii* tended to a random distribution from an aggregated one. The diameter of the *J. morrisonicola* and *A. kawakamii* and the diameter of their dead trees in the plots all showed a reverse J-shaped diameter distribution. After investigating the health of the trees with the DBH above 20 cm in the 2 health assessment plots and the permanent plot F, it was found that there were 743 trees. They were graded into 5 grades: 161 of them were healthy, 204 of them were slightly unhealthy, 121 of them were moderate unhealthy, 224 of them were major unhealthy, and 33 of them were dead. Moreover, the trees in the health assessment plots were less healthy than those in the permanent plot F.

Keywords: Cuei-Chih 、 *Juniperus morrisonicola* 、 death 、 health assessment