

## 江西官山常绿阔叶林邻体结构特征

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**摘要:**【目的】以邻体结构单元为尺度研究常绿阔叶林结构特征, 为森林群落构建、物种共存、群落演替碳循环等研究提供参考。【方法】本文以江西官山 12 hm<sup>2</sup> 常绿阔叶林动态监测大型样地为研究平台, 以个体为研究单位, 先计算每个邻体结构单元的混交度、角尺度、优势度等指标, 然后比较不同物种、功能群、林分的邻体结构特征, 最后分析林分邻体结构的空自相关性。【结果】(1) 25 个主要树种中, 除毛竹(*Phyllostachys edulis*)、杉木(*Cunninghamia lanceolata*) 2 个树种为中度混交外, 其余 23 个树种均为强度混交或极强度混交; 马尾松(*Pinus massoniana*)、麻栎(*Quercus acutissima*)、枫香树(*Liquidambar formosana*)、南酸枣(*Choerospondias axillaris*) 4 个物种的优势度、成熟度均居前列, 红楠(*Machilus thunbergii*)、榕叶冬青(*Ilex ficoidea*)、闽楠(*Phoebe bournei*) 3 个物种则相对较低。(2) 落叶树种邻体结构的各个指标均大于常绿树种; 竹类、阔叶树、针叶树均呈聚集分布格局, 但阔叶树种的混交度、树基开敞度、成熟度均显著大于针叶树、竹类; 阳、中、阴性树种均呈聚集分布, 混交度、树基开敞度表现为阴性树>阳性树>中性树。(3) 大样地群落总体混交度为 0.77, 处于极强度混交等级; 角尺度为 0.54, 林木空间分布格局呈聚集分布; 优势度为 0.50, 林木大小整体处于中庸状态; 树梢开敞度为 0.68, 冠层光照和生长空间充足; 树基开敞度为 0.08, 林下光照和生长空间不足; 成熟度为 0.28, 群落发育年龄相对较低。(4) 以 400 m<sup>2</sup> 林分为统计单元, 邻体结构特征指标的空异质性和空自相关性明显。全局空自相关中, 混交度、角尺度、成熟度、树基开敞度、树梢开敞度 5 个指标的 Moran's *I* 指数分别为 0.3515、0.1331、0.4405、0.3520、0.1787, 在空间上表现显著的空正相关性; 优势度的 Moran's *I* 指数为-0.0374, 在空间上表现不显著的负相关性。局部空自相关中, 混交度、成熟度、树基开敞度在空间上存在较强的聚集现象。【结论】从物种层次来看, 演替早期树种马尾松、麻栎、枫香树等在样地中仍占据较大的优势地位; 从功能群层次来看, 落叶树的发育程度总体上高于常绿树种; 从林分层次来看, 群落发育年龄相对较低, 分布格局呈不稳定的聚集分布, 说明样地森林群落正处于演替初期向演替顶级转变的过渡阶段。林分邻体结构指标的空异质性和空自相关性明显, 但从局部来看林分邻体结构指标的分布有其规律, 因为研究面积足够大时群落是个复合群落, 所以不可能呈均匀状态, 未来群落向顶级演替的过程中将越来越均匀。(800~1000 字。)

**关键词:** 邻体结构特征; 复合群落; 树种生态习性; 空自相关; 官山常绿阔叶林大型监测样地

## The neighborhood structure characteristics of evergreen broad-leaved forest in Guanshan, Jiangxi Province

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**Abstract:**【Objective】The neighborhood structure characteristics of evergreen broad-leaved forest were studied based on the neighborhood structural units, which provided a reference for the study of forest community construction, species coexistence, community succession and carbon cycle. 【Method】Therefore, our study based on Jiangxi Guanshan Evergreen Broad-Leaved Forest Monitoring Plot which large in 12 hectares as platform and

took the individual as a research unit. Firstly, The index of mingling, neighborhood pattern, dominance and so on of each neighborhood unit were calculated. And then the difference of neighborhood structure characteristics of different species, functional groups and stands were compared. Lastly, the spatial autocorrelation of stand neighborhood structure was analyzed. 【Result】(1) Among the 25 major tree species, except for *Phyllostachys edulis* and *Cunninghamia lanceolata* showed moderate mixed state, all the other 23 species showed intense or extremely intense mixed state. *Pinus massoniana*, *Quercus acutissima*, *Liquidambar formosana* and *Choerospondias axillaris* all took the lead in dominance and maturity. And *Machilus thunbergii*, *Ilex ficoidea* and *Phoebe bournei* were relatively low. (2) The neighborhood structural indexes of deciduous tree species were all greater than evergreen tree species. Bamboo species, broad-leaved tree species and coniferous tree species were all showed aggregated distribution pattern. And the mingling, base openness and treetop openness of broad-leaved tree species were significantly greater than the coniferous trees species and bamboo species. The neighborhood pattern of sun-loving, neutral and shade-tolerant tree species were all aggregated. The mingling and base openness of shade-tolerant tree species were greater than that of sun-loving tree species, and sun-loving tree species were greater than that of neutral tree species. (3) The average mingling of Jiangxi Guanshan Evergreen Broad-Leaved Forest Monitoring Plot community was 0.77, which indicated that this community was in a extremely intense mixed state. The neighborhood pattern of this community was 0.54, which means that the tree species was in a crowded state. The dominance was 0.50, which indicated that the size of trees was in the medium state. The treetop openness was 0.68, it means that the light access and growth space of canopy were sufficient. The base openness was 0.08, which indicated that the light access and growth space under the trees were insufficient. The maturity was 0.28, it means that the community was in a young state. (4) We found that the neighborhood indexes showed obvious spatial heterogeneity and spatial autocorrelation if the large plot was divided into 300 stands which large in 400 square meters. In the global spatial autocorrelation, the Moran's index of mingling, neighborhood pattern, maturity, base openness and treetop openness was 0.3515, 0.1331, 0.4405, 0.3520 and 0.1787, respectively. It means that these indexes showed significant spatial positive correlation. And the Moran's index of dominance was -0.0374, which showed no significant negative correlation in space. In the local spatial autocorrelation, the mingling, maturity and base openness showed a strong aggregation phenomenon in space. 【Conclusion】 These results indicated the following conclusions. In terms of species level, the early succession tree species, such as *Pinus massoniana*, *Quercus acutissima* and *Liquidambar formosana* still occupied a dominant position in the Guanshan large plot. From the perspective of functional group level, the age of deciduous tree species was generally higher than that of evergreen tree species. In terms of stand level, the age of Guanshan large plot community was relatively low, the distribution showed aggregated pattern, which indicated that this community was in a succession stage between early stage and climax stage. The spatial heterogeneity and spatial autocorrelation of the stand neighborhood indexes were obvious, but the distribution of the neighborhood indexes of the stand had its own rules in some place. It was because of that the Guanshan large plot community was a complex community with large area, therefore, this community could not be uniform. And the community would become more and more uniform in the process from early stage to climax stage in the future.

**Key words:** Neighborhood structure characteristics; community complex; ecological habits of tree species; spatial autocorrelation; Guanshan Evergreen Broad-Leaved Forest Monitoring Plot