

研究报告

五种木兰科树种在南京地区冬春季节的光合特征

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摘要 研究了自然分布于亚热带不同区域的5种木兰科常绿园林树种在南京地区的冬春季节光合作用和荧光变量的变化特征, 并对影响净光合速率(P_n)的环境因子进行了灰色关联分析. 结果表明: 冬季5个树种的 P_n 和水分利用效率(WUE)日变化曲线与春季差异较大, P_n 日积累值、表观量子效率(AQY)、羧化效率(CE)均低于春季或与春季相近, 初始荧光(F_o)都显著高于春季, 而PS II最大光化学效率(F_v/F_m)、PS II潜在光化学效率(F_v/F_o)、实际光化学效率(Φ_{PSII})、有效光化学效率(F_v'/F_m')、表观电子传递速率(ETR)、光化学猝灭系数(q_p)和非光化学猝灭系数(NPQ)的总体趋势都低于春季. 但供试树种间差异较大, 其中主要分布于中亚热带(湘、赣、浙等地)的乐东拟单性木兰和阔瓣含笑在冬春季节的 P_n 日积分值、 AQY 、 CE 和光饱和点(LSP)均较高, 光补偿点(LCP)较低, F_v/F_m 、 F_v/F_o 、 Φ_{PSII} 、 F_v'/F_m' 、 ETR 和 q_p 也都较高, 表明其光合效能优良、光强利用范围较广; 而主要分布于南亚热带(滇、湘、桂等地)的红花木莲和峨眉含笑冬季光合效能较差, 上述荧光变量也较低. 灰色关联分析表明, 冬季影响树种净光合速率最大的因子是大气温度(T_a), 其次为光合有效辐射(PAR).

关键词 [低温](#) [光合](#) [荧光](#) [木兰科园林树种](#)

分类号

Photosynthesis of five magnolia species in Nanjing City in winter and spring

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Abstract

The photosynthesis and fluorescence characteristics of five magnolia ornamental species naturally distributed in various subtropical areas were studied in Nanjing City in winter and spring. The results showed that the diurnal changes of net photosynthetic rate (P_n) and water use efficiency (WUE) of test species in winter were different from those in spring. The diurnal integral values of P_n , apparent quantum yield (AQY) and carboxylation efficiency (CE) were lower in winter than in spring, and the F_o was higher, while the F_v/F_m , F_v/F_o , Φ_{PSII} , F_v'/F_m' , ETR , q_p and NPQ were lower in winter than in spring. The differences among the five species were remarkable, among which, *Parakmeria lotungensis* and *Michelia platyptala* mainly distributed in middle-subtropical area had higher diurnal integral values of P_n , AQY , CE and LSP , but lower value of LCP than other species in winter and spring. Their F_v/F_m , F_v/F_o , Φ_{PSII} , F_v'/F_m' , ETR , q_p and NPQ were also higher, indicating that they had higher photosynthetic capacity and wider ecological ranges of light adaptability. *Manglietia insignis* and *Michelia wilsonii* mainly distributed in southern subtropical area had lower photosynthetic capacity, and their fluorescence parameters were also lower in winter. Grey correlation analysis showed the main factors affecting the P_n of test magnolia species in winter were T_a and PAR .

Key words [low temperature](#) [photosynthesis](#) [fluorescence](#) [magnolia ornamental species](#)

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