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观赏植物

观赏海棠花色时序动态分布格局研究

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Studies on Sequence Dynamic Distribution Pattern of Flower Color Parameters of Ornamental Crabapple

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摘要 采用X-Rite 色差计对97 个观赏海棠品种大蕾期（S_1）、盛开期（S_2）、末花期（S_3）3 个阶段的花色进行了测定，开展了品种群间的花色关系及时空分布规律研究，旨在为挖掘和创制海棠特异种质和花色育种提供参考。采用Origin7.0 软件构建了观赏海棠品种群花色在CIELCH 色空间中的三维动态分布图，结果表明：在开花进程中，各品种花色在*L**（亮度）、*C**（饱和度）和*h**（色调角）三个维度皆呈规律性空间分布特点和阶段性变化趋势，所有品种的*L**值持续上升而*C**值持续下降，*L* *值高而*C* *值低的品种权重显著增加；在*h* *维度方向，*h* * 值呈增大趋势，分布在红色区域（*h* *值0 ~ 20°）的品种权重由大蕾期的85.6%下降至末花期的52.6%，而分布在黄色区域（*h* *值90° ~ 110°）的品种权重由大蕾期的2.1%
上升到末花期的28.9%。采用SAS6.12 软件构建了花色聚类分析树状图，结果表明：在遗传距离2.17 和1.69 处，97 个海棠品种可以划分为3 大色系和6 个子色系类群，即紫红色系（含紫红、暗紫红和灰紫红3 个子色系）、粉色系（粉红和白粉2 个子色系）和白色系类群，色系/子色系类群之间具有明显不同的色彩参数特征。3 大色系品种花色淡化程度及淡化快慢节律差异显著，在大蕾期—盛开期—末花期的开花进程中，白色系品种呈现由紫红—白（或稍带粉）—白色先快后慢的节律快速淡化为白色，粉色系品种由紫红—粉—淡粉（或近白色）匀速淡化，紫红色系品种（A3 除外）呈现由紫红—紫红—淡紫红先慢后快的节律淡化，总淡化程度显著低于粉花色系。在6 个子色系中，色彩稳定性最强的是暗紫红子色系（A2）和紫红子色系（A1-1），始终保持较高的饱和度，而粉花子色系色彩稳定性则逊色得多。

关键词： 观赏海棠 CIELCH 色空间 花色参数 频率分布 聚类分析

Abstract： With 97 ornamental crabapple cultivars as the research object，its flower color parameters at big budding stage（S_1），blooming stage（S_2）and end flowering stage（S_3）were measured using X-Rite chromatic meter，and the flower color relation among different cultivar series（or subseries）and dynamic pattern of the flower color parameters distribution at different developing stages were studied systematically. The research aimed to provide reference for tapping and establishment of special traits of ornamental crabapples and for breeding and selection of special flower color. Also，the research aimed to provide method reference for other flowering species study. Using Origin7.0 software，a set of dynamic three-dimensional color parameters distribution diagrams of the 97 cultivars in the CIELCH color space at the three flowering stages，were constructed. The results showed that，in the flowering process，color parameter sites in the three dimension of *L* *，*C* * and *h* * presented a certain rule in spatial distribution and moved regularly during the flowering process. In *L* * and *C* * dimensions，the *L* * values of all cultivars increased continually whereas *C* * values decreased. As a result that the percentage of cultivars with higher *L* * value and lower *C* * value increased significantly. In the *h* * dimension，*h* * value of most cultivars showed a trend of increase during the flowering process and ratio of cultivars distributed in the red region（*h* * value = 0 to 20°）decreased from 85.6%（at S_1）to 52.6%（at S_3）whereas ratio of cultivars distributed in the yellow region（*h* * value = 90° to 110°）increased from 2.1% up to 28.9%. Also，using software SAS 6.12，the tree diagram of color clustering analysis was constructed according to flower color parameters in the CIELCH color space at S_2 and S_3 flowering stages. The results as follows，in the genetic distances of 2.17 and 1.69，the 97 crabapple cultivars could be divided into three color series and six color subseries，i.e red purple series（including red purple，dark red purple and greyed red purple subseries），pink series（including pink and white pink subsieries）and white series. Each color series or subseries had their own obvious colour parameter characteristics. For the three color series，there existed significantly differences in color fading

degree and rhythm during flowering process. The white color series of cultivars faded fast and sharply from red purplish（at S_1）to white（or slightly spotted with pink）（at S_2）and then to white（at S_3）. The pink color series of cultivars faded greatly and at a constant speed from purplish（at S_1）to pink（at S_2）and then to light pink（or close to white）. The red purple color series of cultivars faded greatly from purplish red（at S_1）to purplish red（at S_2）and then to light purplish red（at S_3），but its total dilution degree significantly was lower than that of pink series. In the six color subseries of cultivars，the dark red purplish color subseries（A2）and red purplish color secondary subseries（A1-1）have stronger colour stability，continually maintaining a high color chroma value，in contrast with the pink color subseries（B1）.

Keywords： ornamental crabapple， CIELCH color space， flower color parameters， frequency distribution， cluster analysis

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