Use of Phenotypic Plasticity in Selecting Low-Maintenance Landscape Plants

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Plants that can tolerate environmental stresses without altering much of their aesthetics are the best candidates for low-maintenance landscapes. Even though some ornamental plants have generally been considered as low-maintenance plants, an objective measure to decide their tolerance to changing environmental cues is lacking. Phenotypic plasticity as quantified by phenotypic plasticity index (PPI) is one of the phenomena that can be used to cater to the said purpose. The present study was conducted to probe the applicability of the use of phenotypic plasticity as measured by phenotypic plasticity index (PPI) in identifying low maintenance landscape plants.

Five popular ornamental plant species were selected for the study (*Scindapsus aureus, Codiaeum variegatum, Aglaonema crispum, Dracaena sanderiana and Livistonia rotundifolia)*. The study was carried out in a glass house at Dodangolla experimental station, Kandy (IM_3). All five species were exposed to a light gradient continuum; 20, 50 and 100% of full sunlight. Initial measurements of plants were taken at the beginning of the experiment and thereafter bi-weekly for 2 months. Different morphological and physiological parameters were measured; plant height, stem diameter, internodal length, leaf area, stem, root and leaf biomass separately, total biomass, chlorophyll *a*, *b* and total chlorophyll content. Phenotypic plasticity index was calculated for all characters of each species.

The results of the present study revealed that chlorophyll content, chlorophyll *b* in particular, was the trait that has showed the highest plasticity ($P<0.05$) among all phenotypic traits measured, irrespective of the plant species. The highest and the lowest phenotypic plasticity index (PPI) for chlorophyll *b* was recorded in *C. variegatum* (0.92) and *L. rotundifolia* (0.40) respectively. The increase in chlorophyll *b* is a common response in 'shade tolerance syndrome'. Thus, all five species tested in the present study can be considered as shade tolerant species, although the degree of tolerance varies.

Surprisingly, the leaf mass ratio (LMR) of all five species was non-plastic (PPI < 0.15) within the light gradient tested, which indicates that light gradient does not hamper the allocation pattern of these species to alter their foliage mass. If an ornamental plant species can maintain its foliar display irrespective of the light environment within which they exist, such a species can easily be employed in low-maintenance landscapes. Although the leaf size and the number did not change considerably, variegation of *C. variegatum* was lost under 80% shade.

All the species assessed in the present study showed variable degrees of phenotypic plasticity in response to a light gradient continuum. However, most of the morpho-phenotypic traits seem to be less-plastic which suggests these species do not alter their morphology considerably depending on the light environment within which they grow. This validates the use of the concept of phenotypic plasticity to select plants for low-maintenance landscapes.