

Designing with Wild Plants for Conservation of Pollinators and Aesthetics in Urban Areas

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Abstract

Insects are the most economically important and predominant group of pollinators in the world as more than 35% of global food production depend on animal-mediated pollination. The term "Pollinator crisis" manifests as declination of pollinators due to various natural and anthropogenic factors. Therefore, it is vital to apply suitable strategies to restore pollinator diversity to maintain sustainability and productivity in ecosystems. The plant composition in a particular ecosystem is important for population dynamics of insects due to their ability of providing food, habitats and breeding grounds. Easily maintained aesthetically pleasing planting designs are more likely to be appreciated and protected by humans. Therefore, the objective of this study was to determine the ability to attract insects and to evaluate public preference in three different planting designs in order to promote such plant compositions in Sri Lanka.

Based on previous studies, *Spermacoce assurgens*, *Leucas zeylanica*, *Tridax procumbens*, *Merremia tridentate*, *Emilia sonchifolia*, *Ipomoea triloba* and *Cyanthillium cinereum* were selected as wild plants while *Zinnia elegans* was selected as an ornamental plant. Three planting designs (3 m x 3 m), with only wild plants, wild plants mixed with *Z. elegans* and only *Z. elegans* were established as Completely Randomized Designs (CRD) with four replicates. After flowering, monitoring of insects was done in three different planting designs at hourly intervals from 7.00 a.m. to 6.00 p.m. on 10 sunny days in December 2015. The three planting designs were presented to 235 people (200 University community and 35 environmentalists) and they were asked to rank each design 15 minutes after observation based on the given scale (3- like most, 2-like moderate and 1-like least) in a pre-tested questionnaire.

The highest insect species richness (88) was recorded in the design with wild plants mixed with *Z. elegans* followed by the design with only wild plants (78) and design with only *Z. elegans* (43). The design with only wild plants recorded the highest insect diversity followed by the design with wild

plants mixed *Z. elegans* and that with only *Z. elegans*. Out of the recorded insect groups, bees, wasps and butterflies were the most predominant groups in all the three designs. The peak period of insect visitation was from 10.00 a.m. to 12.00 noon. in all designs mainly due to the availability of nectar and pollen. Even though the highest mean number of insect visits per day (260) was recorded in the design with only wild species, it was not significantly different from design with wild plants mixed with *Z. elegans* (198). The significantly lower mean number of visits (119) was recorded in the design with only *Z. elegans*. Ground nests of hymenopterans were observed in adjoining areas of both wild plant and wild plants mixed with *Z. elegans* designs.

There was a significant ($p < 0.05$) difference among median ranks of preference for the three designs. Among environmentalist, the highest median rank (3) was recorded for the design of wild plants mixed with *Z. elegans* while the design with only *Z. elegans* recorded the lowest median rank (1). Among the University community, the highest median rank of 2.5 was recorded for the design with only *Z. elegans* and the least median rank (1) was recorded for the design with only wild plants. However, there was no any significant difference between the design with only *Z. elegans* and the design with wild plants mixed with *Z. elegans*.

The design with wild plants mixed with *Z. elegans* recorded the highest insect richness, diversity and visitation due to its high plant diversity which provides floral resources, habitats and breeding grounds for a wide range of insects. Further, the design with wild plants mixed with *Z. elegans* recorded a higher preference from both environmentalists and University community. Therefore, it can be recommended as a low-maintenance planting design to be implemented in urban landscaping in Sri Lanka, considering its aesthetic value and contribution for pollinator conservation.

Keywords: Aesthetics; Landscaping; Pollinator conservation; Planting designs; Wild plants