

A study for conservation of herbaceous plants at urban green spaces:  
a comparison to suburban secondary forest

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Abstract: The meaning of conservation of urban green spaces in Kyoto city was studied by comparing the herbaceous flora between 15 isolated urban green spaces and a suburban secondary forest. At the 15 urban green spaces of 58.9ha in total, 376 herbaceous plants including 276 native species and 100 alien species were recorded. At a suburban secondary forest of 50.8ha, 355 herbaceous plants including 298 native species and 57 alien species were recorded on the list of herbaceous plants surveyed in the Kamigamo Experimental Forest of Kyoto University by technical officers between 1995 and 1996. The percentage of alien species was significantly high in the urban green spaces, whereas the percentage of native species was significantly high in the suburban secondary forest (chi-square test and Haberman's residual analysis,  $p < 0.05$ ). Similarity coefficients between the urban green spaces and the suburban secondary forest were 0.48 in Jaccard index and 0.65 in Sorenson index. The percentage of perennials that is known to appear in late stage of succession was significantly high in the unique species of the suburban secondary forest (chi-square test and Haberman's residual analysis,  $p < 0.05$ ). This was suggested that a suburban secondary forest had more stable environment in comparison with the urban green spaces. The red-listed species recorded at the suburban secondary forest included *Sarcochilus japonicus* (Orchidaceae), an epiphyte, which grows on tree trunks in humid forests. But no epiphyte was recorded at the 15 urban green spaces. It was supposed that the forests of the isolated urban green spaces had smaller amount of humid environments because they had greater amount of forest edges in comparison with the suburban secondary forest, which was connected to a larger forest area, and because they are sensitive to solar radiation and wind from outside of forests (edge effects). The red-listed species recorded at the urban green spaces included *Veronica didyma* var. *lilacina* (Scrophulariaceae), *Cyperus amuricus* (Cyperaceae) and *C. nipponicus* (Cyperaceae). They were all widespread species at urban areas in the past. However these species were not recorded at the suburban secondary forest. Both *V. didyma* var. *lilacina* and *C. amuricus* were found along compacted paths in non-forest areas of urban green spaces, which was supposed to receive a high amount of solar radiation because there was no shading vegetation. It was considered that suburban secondary forests provide fewer amounts of suitable sites for the species. Although it cannot be directly concluded, it was considered that the urban green spaces had a function to conserve some rare herbaceous plant species that had once grown in immediate natural environments. Additionally, although the nature at urban areas was once considered to be inferior to that of suburban or rural areas in terms of wildlife habitats, it was revealed that the urban green spaces included unique rare herbaceous plants that were likely to be adapted to the environments. It was indicated that the urban green spaces as well as suburban secondary forests in Kyoto city are worthy to be conserved.

Key words: *herbaceous plant species, urban green space, suburban secondary forest, biodiversity, red-listed species*