論　文

Understanding urban trees of Setagaya city in correlation with the interests and perceptions of forestry students

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Abstract: Urban forestry involves the art, science and technology of managing trees and forest resources in and around urban community ecosystems. Also, urban forestry is just as much about people as about trees. This research surveyed 851 urban trees spread both over 6 km of Setagaya-dori main street and in 4961.49 m^2 space of selected green open parks in Setagaya area. The research also collected 29 forestry students' opinions about urban trees. Tree attributes surveyed included; species scientific name, tree height, trunk diameter (DBH), crown diameter and GPS coordinates. Tree data was collected with the use of Open Foris Collect software. Opinions of 29 students were collected using google form survey. A total of 29 tree species were surveyed, 13 species discovered in the open green parks only, 8 species discovered on Setagaya Dori only, and 8 species found common in both parks and on Setagaya dori. Street dominant tree species i.e *Liquidambar formosana*, *Ginkgo biloba*, etc. have a larger number of individuals than park dominant species i.e *Camelia japonica*, *Osmanthus fragrans*, etc. Forestry students felt no need to change the current state of the Urban trees in Setagaya.
Keywords: Urban trees, Setagaya ward, forestry students, opinions and interests

林学科の学生の興味・関心と世田谷区の都市樹の相関関係

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概要: 都市林業は、都市コミュニティの生態系とその周辺にある樹木や森林資源を管理する芸術、科学、技術に関わっている。また、都市林業は、樹木と同様に人間にも関与することが特徴である。本研究では、世田谷通り 6 km と世田谷区立緑地公園 4961.49 m^2 に分布する 851 本の都市緑化植物を調査した。また、大学林学科の学生 29 名から都市緑化樹木に関する意見を合わせて聴取した。調査対象となった樹木は、樹高、胸高直径、樹冠径、GPS 座標を調べた。樹木のデータは、ソフトウェア Open Foris Collect を用いて収集し、林学科の学生の意見は、google form アンケートで収集した。調査対象となった樹種は、緑地公園のみで発見された 13 種、世田谷通りのみで発見された 8 種、緑地公園と世田谷通りの両方で見られる 8 種の計 29 種である。調査の結果、街路樹の優占種であるタイワンフウ、イチョウなどは、公園の優占種であるヤブツバキ、キンモクセイなどよりも出現数が多く、林学科の学生は、世田谷の都市樹の現状を変える必要性をあまり感じていないことが示された。
キーワード 都市緑化樹木、世田谷区、林学科学生、興味・関心

I. Introduction

Measuring and monitoring urban trees has been conducted for over a century (*2*). Without detailed data on the location, structure, and condition of city trees, it is not possible to manage them effectively, nor to estimate ecosystem service provision or urban forest value, nor to develop informed policy or strategy (*1*). An overall street tree management programme consists of establishing of trees, including species selection, acquisition and actual planting (*3*). However, Urban forestry is just as much about people as about trees and thus there exists important relationships and interests between people and trees (*1*). Attitudes towards public trees can vary by neighborhood, community, region and ethnic background. Being aware of neighborhood, local, and regional values is extremely important in selecting species for city streets (*3*). A critical step in building public support for urban forestry programs is to determine the public's knowledge and perception of the urban forest and the importance the public attaches to it (*4*).

Therefore, this study surveyed urban trees in Setagaya city to understand the tree species composition of tree parks and Setagaya dori street by collecting tree data i.e. (species type,

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DBH, crown diameter, tree height and tree health). Additionally, opinions and interests of forestry students were gathered about the city's trees and this information can inform better species selections for the city of Setagaya.

II. Materials and methods

1. Site: The site of survey is Setagaya ward. Tree data from a 6 km length of Setagaya-dori street and eight selected open public parks with a total space of 4961.49 m^2 was collected. The selection of this survey area was based on its proximity to Tokyo University of Agriculture (NODAI). 851 trees were surveyed in total. 29 forestry students were interviewed using the online google forms for their opinions and interests of trees on roads and in parks of Setagaya city. These are (NODAI) students who study / live in Setagaya. The tree attributes surveyed include; species type, tree height, crown diameter, DBH, tree GPS coordinates and tree health.

2. Tree species type and dominance; This research surveyed the type of tree species on Setagaya dori street and in eight open green parks. The proportion of individuals in the different species was used as a measure to classify the dominant and non-dominant tree species.

3. Tree height; This research also measured tree heights for all individual trees surveyed using the Blume Leiss hypsometer.

4. Crown diameter; This research also gathered data on tree crown diameter for every tree surveyed, using a method of pacing and checking with a measuring tape.

5. Diameter at breast height (DBH); This research also collected data on trunk diameter for every tree surveyed, using a diameter tape.

6. GPS coordinates; This research also gathered data on individual tree position, using the android tablet fitted with Open Foris Collect software. The software package gathers digital tree data for field-based forestry inventories.

7. Tree health and age estimation; Tree health was assessed for every individual tree by use of the criteria as provided by the International Society of Arboriculture (ISA) i.e. Accurate identification of the tree, careful examination of the landscape, and assessment of tree roots, trunk and leaf situation *(5)*. Tree age was estimated by visual assessment of the size of tree parameters i.e. trunk size, height and crown size etc.

III. Results and Discussion

1. Species distribution and abundance

This research surveyed a total count of 29 tree species, of which 13 species (44.8%) of the total are growing in green parks, 8 species (27.6%) growing on Setagaya street and 8 species (27.6%) growing both in parks and on Setagaya street (Table 1). The difference in species composition is characteristic of multi-dimensional urban spaces (*6*). Street dominant tree species i.e. *Liquidambar formosana, Ginkgo biloba, Acer buergerianum,* etc. have a larger number of individuals than park dominant species i.e. *Prunus yedoensis, Camelia japonica, Osmanthus fragrans, Ilex rotunda* etc. (Fig.1)

2. Average tree height, Dbh and crown diameter

Fig. 2 shows the average height of individual tree species surveyed. The street dominant tree species i.e *Ginkgo biloba* and *Zelkova serrata* have higher average heights than park dominant tree species. This is because road side trees are planted close to one another and thus compete for height other than investing in outward expansion.

Figs. 3-4 show the average DBH and crown width of individual tree species surveyed respectively. With exception of *Pinus thunbergii*, park dominant tree species i.e *Prunus yedoensis and Zelkova serrata* have largest DBH and crown widths than street dominant species because they have a lot of space to invest in outward growth i.e tree crown and tree stem diameter growth are very sensitive to competition (*9*).

3. Health and age estimation of trees

Fig. 5 shows the health of trees surveyed. About 843 trees (99.9%) of surveyed trees are in healthy condition, 5 trees (0.0035%) are in declining health condition and 3 trees (0.0059%) are diseased. The street tree health condition was highly influenced by the prevailing urban stresses, including confined growth space, conflict with above-ground infrastructures, and frequent pruning (*7*). About 77% of all street trees were estimated to be over 30 years of age while only 26% of all park trees were estimated to be over 30 years of age. This is largely because parks almost always have available planting spots to accommodate new and younger trees.

Table 1 A distribution of species surveyed

	Parks only	Setagaya Dori only	Shared species
Species abundance	13	8	8
Species %	44.8%	27.6%	27.6%

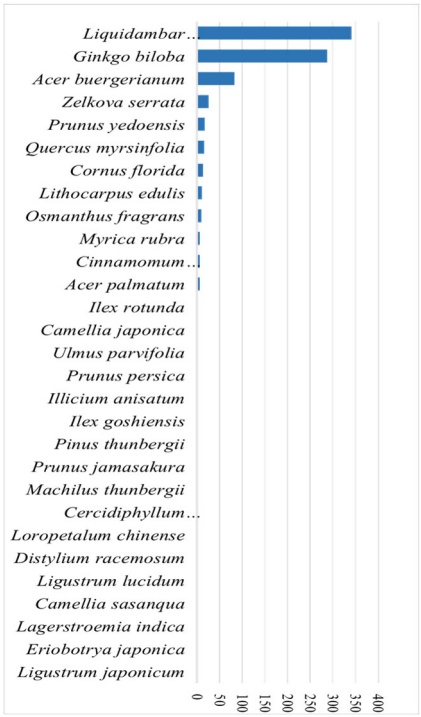

Fig. 1 Number of individuals in each species surveyed

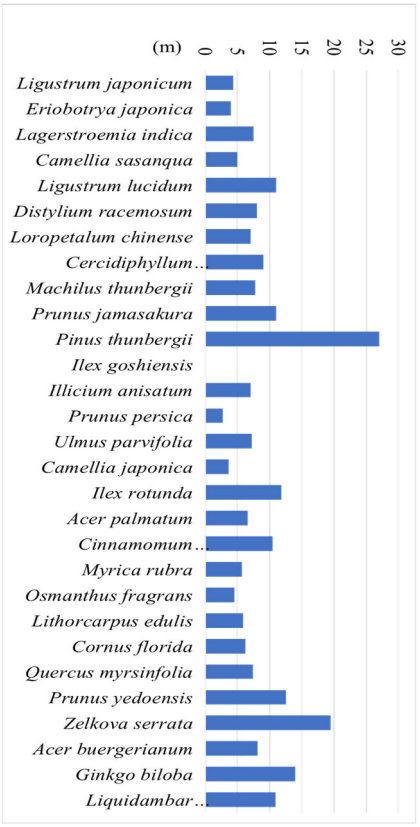

Fig. 2 Average heights of each species surveyed

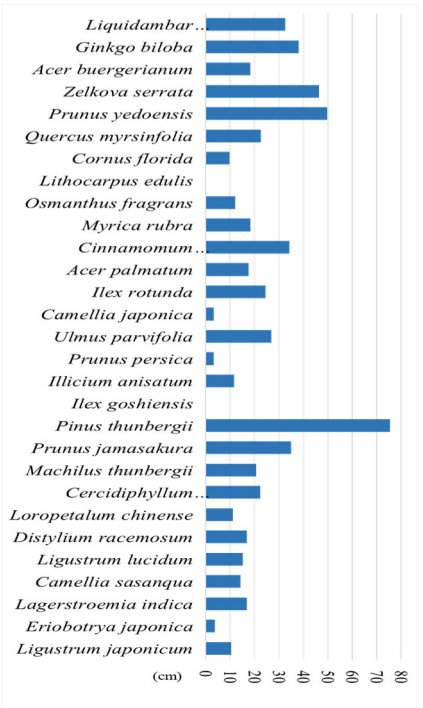

Fig. 3 Average DBH of each species surveyed

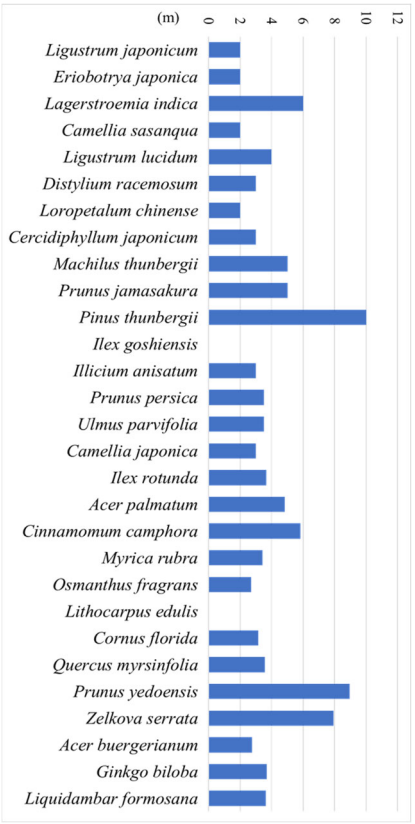

Fig. 4 Average Crown width of species surveyed

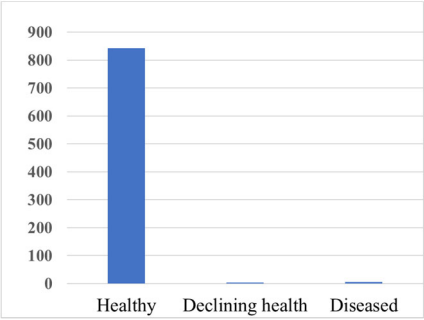

Fig. 5 Health of trees surveyed

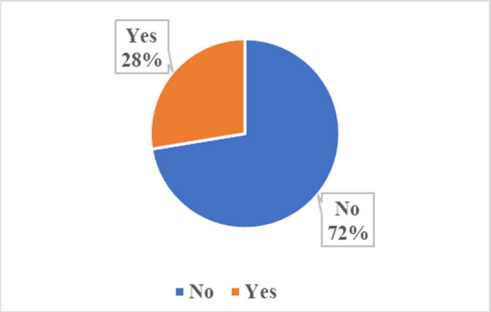

Fig. 7 Opinions of students about changing the standing tree types available in Setagaya

4. Perceptions of forestry students about trees of Setagaya city

Fig. 6 shows the commonest tree species often seen by forestry students on Setagaya street and in eight parks of Setagaya city. *Ginkgo biloba*, *Prunus yedoensis* and *Zelkova serrata* are the trees most identified by the forestry students. This suggests that these are the trees that they associate with the most.

Fig. 7 shows opinions of forestry students about changing the tree species types planted in Setagaya city. The majority of students (72%) do not support a change of tree species in Setagaya city. This in itself is a positive review about the existing trees of the city (*8*)

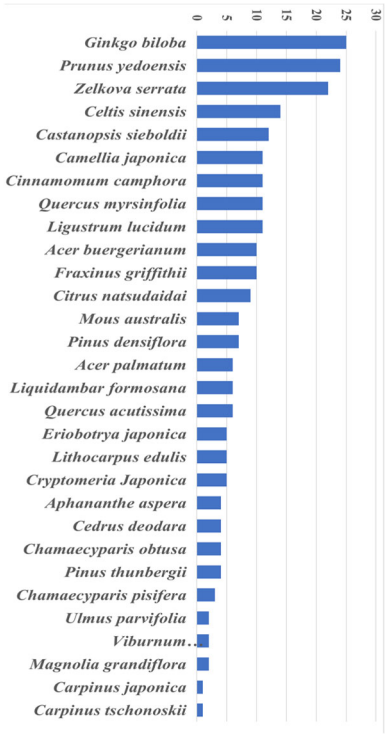

Fig. 6 A selection of trees commonly seen by forestry students

IV. Conclusion

This research shows that *Liquidambar formosana* (*Fuu*), *Ginkgo biloba* (*Ichoo*), *Acer buergerianum* (*Toukaede*) and *Zelkova serrata* (*Keyaki*) are the most dominant tree species in Setagaya research area. This research also found that *Liquidambar formosana* (*Fuu*) is very unknown to the forestry students. This research also found a larger number of young trees in parks than on Setagaya street, this represents more planting opportunities in parks than on Setagaya street. This research also showed that more forestry students (72%) do not support a change of tree species currently growing in Setagaya city thus the standing trees should be maintained as it is.

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