Guidelines for Selecting Native Species for Greening
—Towards Biodiversity-Conscious Greening—

May 2014
Bureau of Environment, Tokyo Metropolitan Government
Guidelines for Selecting Native Species for Greening

Table of Contents

Text
1. Status of the Guidelines 1
2. Goals of the Guidelines 2
3. Classification of Plant Species for Biodiversity Conservation 3
4. How to Select Plants (Native Species) 6

Reference Materials: Lists of Plants
[List A] List of native species for planting in the mainland of Tokyo 24
[List B] List of Invasive Alien Species (designated by the Invasive Alien Species Act) 41
[List C] List of Invasive Alien Species (not designated by the Invasive Alien Species Act) 43
1. Status of the Guidelines

- Environmental loads from human activities are said to result in an annual loss of approximately 7.3 million hectares of forests and the extinction of approximately 40,000 organisms on the Earth. In Tokyo, green areas have tended to decrease over time, resulting in a number of problems, including the adverse effects of alien species etc. on local ecosystems.

- Against this background of such crisis of biodiversity, the Tokyo Metropolitan Government (TMG) published its regional biodiversity strategy entitled “Tokyo Green Plan 2012: City Biodiversity Strategy” in May 2012, launching new measures such as those for not only securing the “quantity” of greenery but also increasing the “quality” of greenery, including biodiversity conservation.

- TMG has so far been proactively implementing comprehensive programs for urban greening with the participation and cooperation of private sectors, NPOs, and Tokyo residents, including the establishment of the Umi-no-Mori (Sea Forest) and urban parks, doubling the number of roadside trees, grassing schoolyard, and rooftop/wall greening. In addition, greening program is implemented at private sector facilities in the context of urban development.

- In urban areas, however, alien species, both domestic and foreign origin, have been widely used for greening because of demands for beautiful landscapes, easy maintenance, pest resistance, and other factors. As a result, in Japan, a number of unwanted cases have been reported, in which the survival of existing native species is threatened by some reproductively vigorous ones of these alien species, or the composition is monotonous, such as consisting exclusively of a single tree species or a set of only taller trees or shrubs, due to excessive importance placed on reforestation cost and maintenance efficiency.

- Against this background, in the Tokyo Metropolis (Tokyo), pioneering efforts are emerging to restore the natural occurrence of native birds and insects occurring around the site by implementing greening programs making the best use of native species essentially occurring in each site. For example, planting Japanese pepper trees (Zanthoxylum piperitum) will provide habitat for the larvae of swallowtail butterflies, and planting yabutsubaki (Camellia japonica var. decumbens) will attract white-eyes, a nectar-sucking bird species; planting native species plays important roles in providing habitats for indigenous animals. To promote greening with native species while taking into account vegetative continuity to the natural conditions in the areas around the greenery is believed to contribute to the networking of habitat for a wide variety of animals, and to be effective in conserving and restoring the biodiversity for urban areas, where adequate green spaces are lacking.

- In addition, if history, culture, utilization of existing trees, safety and security, and other factors must be taken into account for a planting project at a site of limited space, it is sometimes difficult to achieve the goal merely by planting only native species. It is believed that to improve the “quality” of greenery in urban areas in the future, emphasis should be placed not only on their anthropogenic use, but also on the biological availability of natural vegetation to living organisms as a new perspective of planting for urban greening.

- Accordingly, the Guidelines have been formulated to propose selecting native species for planting on the basis of the native species composition appropriate for the environment of the planting site. The Guidelines are designed as reference for restoring biodiversity and implementing greening programs that consider indigenous animals.

- We hope that the Guidelines will be widely utilized by all persons concerned with the greening of urban areas to promote green networking by planting native species in Tokyo.
In its “Tokyo Green Plan 2012” published in May 2012, TMG presents goals to be accomplished through its future.
To realize one of them, “Tokyo will be blessed with nature from season to season, and will be successfully restoring regionally-balanced ecosystems and providing sustainable built environment that enables people and other organisms to live together” we considered it necessary to promote efforts for the two goals shown below, in accordance with the Guidelines.

(1) Promote Greening for Biodiversity Conservation
In Tokyo, the lance-leaved tickseed (Coreopsis lanceolata), the golden glow (Rudbeckia laciniata), and other invasive alien species as defined by the Invasive Alien Species Act (hereinafter referred to as “designated alien species”) have been shown to occur. These plants are said to have spread from planting for ornamental purposes and adversely affect the ecosystem unique to the area. In addition, glossy privet (Ligustrum lucidum) (a non-designated invasive alien species as defined by the Invasive Alien Species Act), which has been planted in parks and as roadside trees for its high resistance to air pollution, is posing problems including competition with native species due to its reproductive vigor and rapid growth.
In summary, use of a plant that has not occurred in the area is highly likely to adversely affect the ecosystem unique to the area. Therefore, it should always be born in mind that native species that essentially occur in the area should be used to help improve the essential biodiversity in the area.

(2) Networking of habitats by indigenous animals
With regard to changes over time in greenery and water distribution ratio by intended use in Tokyo, the green and water distribution ratio decreased over a 5-year period from FY2003 to FY2008 by 0.5 points for farm lands, 1.4 points for forests, uncultivated fields, and grass lands, and 1.7 points for all areas together. As a green area is increasingly fractionated with progression of urbanization, it becomes increasingly difficult for birds and mammals in need of adequate green spaces to survive there, resulting in decreased diversity of species. To avoid this event, it is important to form a network of the fractionated green areas by making the best use of newly created greenery, to restore habitats for various organisms.
In this process, a planting program making the best use of native species is expected to allow indigenous birds and insects that are essentially distributed in Tokyo to feed therein, thus providing sites for their nesting and egg laying.
From the viewpoint of promoting biodiversity-conscious greening and networking habitats for indigenous animals, the Guidelines particularly recommend the use of native species to be planted. In other cases as well, we would like you to utilize the Guidelines as a reference material when you evaluate the influence of planted plants on ecosystems. From the viewpoint of promoting the planting of biodiversity-conscious native species, plants can be divided into four categories (Table 1).

Table 1. Classification of plants for promoting biodiversity-conscious greening

<table>
<thead>
<tr>
<th>(1) Plants suitable for planting</th>
<th>(2) Plants that can be used according to the purpose of greening</th>
<th>(3) Plants requiring special cautions in planting</th>
<th>(4) Plants not suitable for planting</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1. Native Species &lt;br&gt;Ex) Styrax japonica</td>
<td>2-1. Cultivars &lt;br&gt;Ex) Cerasus x yedoensis, Rhododendron &lt;br&gt;oomurasaki Makino</td>
<td>3-1. Native Species of High Productive Vigor &lt;br&gt;Ex) Pleioblastus chinensis</td>
<td>4-1. Designated Invasive Alien Species &lt;br&gt;Ex) Coreopsis lanceolata, Rudbeckia laciniata</td>
</tr>
<tr>
<td>2-2. Non-invasive Alien Species(Domestic and Foreign Species) &lt;br&gt;Ex) Cinnamomum camphora, Ginkgo biloba</td>
<td></td>
<td>3-2. Invasive Alien Species &lt;br&gt;Ex) Trachycarpus fortunei, Phyllostachys pubescens</td>
<td>4-2. Non-designated Invasive Alien Species &lt;br&gt;Ex) Ligustrum lucidum</td>
</tr>
</tbody>
</table>

(1) Plants suitable for planting
The following are plant species that are desirably chosen to avoid adverse effects on the ecosystem, and to help restore the biodiversity.

1-1. Native species
A native species refers to a plant belonging to a species, subspecies, or lower taxon that is naturally distributed in a planting area.
Planting native species offers the following advantages:
- Habitats for naturally distributed indigenous animals are provided.
- Nature-rich landscape based on regional characteristic can be created.

(2) Plants that can be used according to the purpose of greening
Although the plants listed in 2-1 and 2-2 below do not represent recommendations by the Guidelines, they are believed not to adversely affect the local ecosystem at the planting site, and are hence useful depending on the purpose of planting (land use, disaster prevention) and other factors.

2-1. Cultivars (including horticultural varieties)
A cultivar refers to a plant variety that has been bred for character improvement, and given a specific variety name. Cultivars can be utilized in planting for creating landscapes suitable for the planting site and other purposes. Examples include the Yoshino cherry (Cerasus x yedoensis),

3. Classification of Plant Species for Biodiversity-Conscious Greening
Omurasaki azalea (*Rhododendron oomurasaki* Makino), Kurume azalea (*Rhododendron* x obtusum), Japanese kerria (*Kerria japonica* f. *plena*), and Wabisuke camellia (*Camellia wabisuke*).

2-2. **Non-invasive alien species (domestic or foreign species)**

A non-invasive alien species refers to a plant belonging to a species, subspecies, or lower taxon that is believed to have no adverse effect on the local ecosystem of the planting site, and is naturally distributed in an area other than Tokyo in Japan or outside Japan. Such plants can be utilized in place of native species in cases of planting for fire spread prevention, landscaping, and other purposes that cannot be accomplished using the native species. Examples include the camphor tree (*Cinnamomum camphora*), ginkgo (*Ginkgo biloba*), dogwood (*Benthamidia florida*), and American sweetgum (*Liquidambar styrciflua*).

(3) **Plants requiring special cautions in planting**

When utilizing a plant that cannot occur in its essential natural habitat in Tokyo, or a plant that is a native species, but can grow thick to the extent that adversely affect ecosystems, special cautions should be exercised, including periodic implementation of appropriate maintenance measures. For example, it is desirable that measures to prevent the plant from spreading in areas around the planting site should be implemented, such as trimming of plants that spread by their seeds prior to seed production and periodical trimming of plants that spread by their stems, roots, and the like.

3-1. **Native species of high reproductive vigor**

A native species of high reproductive vigor refers to a plant that is native to Tokyo, but can grow densely into a monotonous vegetation with its high reproductive power, thus adversely affecting ecosystems. Examples include the azumanezasa (*Pleioblastus chino*).

3-2. **Invasive Alien species (both domestic and foreign alien species)**

An alien species specified as invasive refers to a domestic alien plant species that cannot grown in Tokyo in its essential natural distribution, or a foreign alien species that is neither a designated alien species nor a non-designated invasive alien species, and that has been pointed out by municipalities around Tokyo, experts, and other entities to potentially adversely affect ecosystems. Examples of “invasive” alien species include the Chusan palm (*Trachycarpus fortunei*), the moso bamboo (*Phyllostachys pubescens*), firethorns (e.g., yellow firethorn (*Pyracantha angustifolia*) and scarlet firethorn (*Pyracantha coccinea*)), and the tree of heaven (*Ailanthus altissima*).
(4) **Plants not suitable for planting**  
Use of the following plants should be avoided from the viewpoint of biodiversity conservation. Planting and transfer of designated alien species, in particular, are banned by law as they can adversely affect the local ecosystem.

4-1. **Designated alien species**  
Plants that can significantly affect ecosystems in Japan are handled as “designated alien species” by the Invasive Alien Species Act. With regard to any designated alien species, its cultivation, storage, transportation, sales, transfer, import, release into the outdoor, and the like are prohibited as a rule, with violations of this rule being punished by law.

![Photo 3. Lance-leaved tickseed (*Coreopsis lanceolata*) (designated alien species)](image)

![Photo 4. Golden glow (*Rudbeckia laciniata*) (designated alien species)](image)

4-2. **Non-designated invasive alien species**  
Plants that are not subject to the regulations based on the Invasive Alien Species Act, but can adversely affect ecosystems are specified as requiring cautious handling by the Ministry of the Environment. It is strongly desired that these plants should not be newly planted as a rule.

![Photo 5. Glossy privet (*Ligustrum lucidum*) (non-designated invasive alien species)](image)

![Photo 6. Yellow flag (*Iris pseudoacorus*) (non-designated invasive alien species)](image)

*After its publication, the List of Invasive Alien Species (tentative designation), which is currently in preparation by the Ministry of the Environment as of FY2013, (3) plants requiring cautious use for planting, and (4) plants not suitable for planting should also be referenced to.*
4. How to Select Species for Planting (Native Species)

How to select appropriate species and relevant considerations in planting native species are shown below.

How to Select Species for Greening (Native Species) and Relevant Considerations

**Selection of Candidate Species for Planting (Native Species)**

Identify:
1. Types of plant community and
2. Native species for the target area using the Potential Natural Vegetation Map of Tokyo Metropolis.

Identify:
1. Types of plant community and
2. Native species for the target area according to substitutional vegetation on Potential Natural Vegetation of Tokyo Metropolis.

Survey vegetation currently occurring around the target area to identify native species occurring in and around the target area.

**Assessment of combinations of plants for planting (native species)**

**Special Considerations**

* Scope described in the Guidelines

1. Formation of hierarchical structure
2. Laying a planting basis
3. Arrangement of trees and herbaceous plants
4. Initial management
5. Density management
6. Use of seeds and nursery stocks of local plant species

* Items to be assessed and implemented for each plan
(1) **Selection of species for planting (native species)**

Even within Tokyo, different vegetation occurs at different locations depending on climate, topography, geology, and other factors. As a reference material that helps finding native species suitable for the planting site, the Potential Natural Vegetation Map of Tokyo (see page 14) is available for the understanding of "natural vegetation" and "substitutional vegetation" that are suitable for the site. In addition, native species suitable for the planting site can also be selected by referring to native species actually occurring in natural vegetation around the site.

It is recommended; therefore, that plants for greening be selected from among native species suitable for the intended use of the planting site and environmental conditions (sunlight etc.) is selected using a combination of the three methods shown below.

In addition, species suitable for the planting site should be selected in a good balance taking into account their type of tree (evergreen or deciduous), flowering stage, seed-setting stage, and other factors.

(Identifying potentially occurring vegetation)

1-1. **Identification of natural vegetation plant community and its component species**

The availability of natural vegetation occurring in the absence of human activity in Tokyo can be known by means of the Potential Natural Vegetation Map of Tokyo and distribution patterns of potential natural vegetation (pages 15-21). For example, the majority of Tokyo's natural vegetation is composed mainly of evergreen broad-leaved forests. Examples of component species for natural vegetation are given in Table 3 (page 13), which allows candidate species for planting to be selected from among the listed species.

In selecting trees and other plants for planting, it is desirable that the micro topography and other factors of the planned site should be taken into account in accordance with the distribution patterns of potential natural vegetation and other reference materials.

1-2. **Identification of substitutional vegetation plant community and its component species**

In addition to the step of 1-1, substitutional vegetation, which emerges from the original vegetation under the influence of human activities, such as coppice forests, can also be known using the Potential Natural Vegetation Map of Tokyo Metropolis and other reference materials. Shown in the lower field of Table 3 (see page 13) are plant communities for substitutional vegetation corresponding to natural vegetation. Example selections of component species for substitutional vegetation are given in Table 4 (see page 14). Candidate species for planting can be selected from among them.

Because the majority of Tokyo's natural vegetation is composed of evergreen broad-leaved forests, selecting plants for greening based solely on the natural vegetation can lead to the formation of a thick forest with many candidate species for planting selected from among evergreen trees. When taking into account planting for recreation sites in an urban area, plants may be selected with a focus on substitutional vegetation for such reasons as that planting based primarily on evergreen trees is undesirable from the viewpoint of crime prevention.
(Identifying actually occurring vegetation)

1-3. Identification of vegetation existing around the planting site by field surveys etc.

In selecting appropriate plants for planting, native species occurring naturally in areas around the planting site should be identified by means of field surveys and other approaches. Using the same native species as those in areas around the planting site can promote improving local biodiversity because of the formation of animal paths and the provision of feeding spots for indigenous animals occurring around the site. In addition to field surveys, reference materials describing plants that grow in the region are also helpful.

(2) Special considerations

Matters desirably taken into account in planting (may be difficult due to planting site conditions) are shown below.

1-1. Formation of hierarchical structure

If it is intended to create a green area inhabited a diverse range of animals, tall trees, intermediate trees, shrubs, and herbaceous plants should be combined into hierarchical structure, rather than a single-layer structure, so as to form a multi-layered forest in the future.

In forests, the amount of light decreases as the ground is approached because of light shading by tree leaves. Responding to these light conditions, plants form a layer structure. Spatial complexity from well developed layer structure allows a wide variety of organisms, e.g., the Japanese pygmy woodpecker, which utilizes a wide space, from the tree layer to the shrub layer, the white-eye, which utilizes the forest canopy, and locusts, which utilize the herbaceous stratum, to survive there while adapting to the spatial characteristics of respective zones.

Photo 7. Forest with a well-developed hierarchical structure
1-2. Laying a planting basis
Most planting sites are situated in developed lands, lacking topsoil. While topsoil is critical to plant growth, most plant species need deep and fertile topsoil. For this reason, it is important to implement appropriate measures for laying a planting basis such as soil improvement and bringing soil from another place according to the species planted.

1-3. Arrangement of trees and herbaceous plants
To create a forest with a well-developed hierarchical structure, it is desirable that the planted plants should be appropriately arranged in view of their heights and coverages expected to be reached in their maturity. Keys to successful greening include taking into account the canopy width of the tree layer and the overlap of the sub-tree layer and shrub layer, avoiding excessive planting of evergreen trees in the tree layer, and paying special attention to the shade tolerance of understory plants in the combination of plant species.

1-4. Initial management
Early after planting, alien species, climbing plants, bamboos (including Sasa spp.), and other plants that are the first invaders in wasteland can sometimes grow thick to the extent that interferes with the growth of the planted plants. To prevent this, it is desirable that managerial measures should be implemented, including periodical weedkilling, vine removal, and cutting unwanted tree species, early after planting.

1-5. Density management
Various measures are sometimes implemented to secure adequate volume of greenery at early stages, including preferential use of evergreen trees or rapidly growing species and dense planting. In such cases, it is desirable that appropriate density management measures such as thinning should be taken according to tree growth.

(Source: Manual of the Creation and Management of Green Areas etc. at Public Facilities and Citizen-Participating Natural Environmental Surveys, Natural Conservation Bureau, Ministry of the Environment, March fiscal 2009.)
1-6. **Use of seeds and nursery stocks of local plant species**

A population of individual plants of native species that share a set of genes characteristic of plants occurring in a certain region is known as a regionally characteristic lines. Use of regionally characteristic lines characteristic of the planting site avoids adverse effects on ecosystems, such as the spread of a plant with a gene that should not occur normally in the target area. Therefore, if it is feared that the ecosystems around the planting site can be affected at the genetic level, it is desirable that seeds collected at the planting site or elsewhere around it and nursery stocks bred from such seeds should be obtained. If seeds and seedlings are difficult to obtain the planting site or its vicinity, it is desirable that plant materials should be procured from prefectures near Tokyo whenever possible to reduce the risk of causing genetic disruption. Currently, seeds and nursery stocks of known genetic information are not available in adequate numbers, posing a problem with securing such resources.

(3) **Example selections of species for planting (native species)**

The procedures for selecting species for planting at a site at Nishishinjuku in Shinjuku Ward of Tokyo, for example, are as follows:

<table>
<thead>
<tr>
<th>Table 2. Example selections of species for planting (native species)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong></td>
</tr>
<tr>
<td><strong>2</strong></td>
</tr>
<tr>
<td><strong>3</strong></td>
</tr>
</tbody>
</table>
4 Confirm from Table 4 example selections of component species for substitutional vegetation konara-iigiri community.

5 Identify native species occurring in natural habitats around the planting site by conducting a field survey and referring to documents describing plants that occur in the planting site.

6 Select plants for planting from among the native species identified as falling in categories 1-5, while paying attention to the special considerations.
### Table 3. Examples of natural vegetation plant communities and their component species (yabutsubaki (Camellia japonica) region)

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</tr>
</thead>
<tbody>
<tr>
<td>Higher tree layer</td>
<td><strong>Mukunomi-Japanese hackberry alliance</strong></td>
<td><strong>Japanese white oak</strong></td>
<td><strong>Japanese white oak</strong></td>
<td><strong>Japanese white oak</strong></td>
<td><strong>Japanese white oak</strong></td>
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<tr>
<td>Subhigher tree layer</td>
<td><strong>Japanese white oak (Quercus glauca)</strong></td>
<td><strong>Japanese white oak</strong></td>
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<td><strong>Japanese white oak</strong></td>
<td><strong>Japanese white oak</strong></td>
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<tr>
<td>Subsubtree layer</td>
<td><strong>Japanese white oak (Quercus glauca)</strong></td>
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<tr>
<td>Shrub layer</td>
<td><strong>Japanese white oak (Quercus glauca)</strong></td>
<td><strong>Japanese white oak</strong></td>
<td><strong>Japanese white oak</strong></td>
<td><strong>Japanese white oak</strong></td>
<td><strong>Japanese white oak</strong></td>
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<tr>
<td>Subshrub layer</td>
<td><strong>Japanese white oak (Quercus glauca)</strong></td>
<td><strong>Japanese white oak</strong></td>
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<tr>
<td>Grass layer</td>
<td><strong>Japanese white oak (Quercus glauca)</strong></td>
<td><strong>Japanese white oak</strong></td>
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<tr>
<td>Subgrass layer</td>
<td><strong>Japanese white oak (Quercus glauca)</strong></td>
<td><strong>Japanese white oak</strong></td>
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<tr>
<td>Herbaceous layer</td>
<td><strong>Japanese white oak (Quercus glauca)</strong></td>
<td><strong>Japanese white oak</strong></td>
<td><strong>Japanese white oak</strong></td>
<td><strong>Japanese white oak</strong></td>
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</tbody>
</table>

**Notes:**
- **Mukunomi-Japanese hackberry alliance:**
  - Subassociation: Japanese white oak (Quercus glauca)
- **Japanese white oak (Quercus glauca)**:
  - Subassociation: Japanese white oak (Quercus glauca)
- **Japanese white oak (Quercus glauca)**:
  - Subassociation: Japanese white oak (Quercus glauca)
- **Japanese white oak (Quercus glauca)**:
  - Subassociation: Japanese white oak (Quercus glauca)
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- **Japanese white oak (Quercus glauca)**:
  - Subassociation: Japanese white oak (Quercus glauca)
- **Japanese white oak (Quercus glauca)**:
  - Subassociation: Japanese white oak (Quercus glauca)
- **Japanese white oak (Quercus glauca)**:
  - Subassociation: Japanese white oak (Quercus glauca)
Table 4. Examples of substitutional vegetation plant communities and their component species (yabutsubaki (*Camellia japonica*) region)

<table>
<thead>
<tr>
<th>Community</th>
<th>Konara-Japanese maple (Camellia japonica) association</th>
<th>Japanese red pine (Pinus densiflora) torch azalea (<em>Rhododendron kaempferi</em>) association</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shrub layer</td>
<td>Japanese hornbeam, mountain maple, mountain azalea, mountain yew</td>
<td>Japanese hornbeam, mountain maple, mountain azalea, mountain yew</td>
</tr>
<tr>
<td>Herbaceous layer (forest bed)</td>
<td>Japanese hornbeam, mountain maple, mountain azalea, mountain yew</td>
<td>Japanese hornbeam, mountain maple, mountain azalea, mountain yew</td>
</tr>
</tbody>
</table>

*While a potential natural vegetation in Tokyo (mainland) consists of plant communities in the yabutsubaki (*Camellia japonica*) region, beech (*Fagetae crenata*) region and yezo spruce-lingonberry (*Vaccinio-Piceetum*) region, places where urban area greening is to be implemented according to these guidelines are located mainly in the yabutsubaki (*Camellia japonica*) region. Accordingly, examples of natural vegetation plant communities found in the yabutsubaki (*Camellia japonica*) region and their component species are given in Tables 3 and 4.

*In addition to those listed in Tables 3 and 4, other native species suitable for various locations are available.

*If a planting basis is ensured, the native species listed in Tables 3 and 4 are unlikely to grow healthy.
For reference, caption numbers (association No.) are shown on associations with wide area coverage.

Locations of associations and communities are not clearly indicated, so this information should be used only as an index.

In cases where the name of an association or community cannot be clearly identified, such as when the planting site is situated in the vicinity of the borders of the association or community, it is recommended that applicable associations and communities should be referenced to after identifying the environment of the planting site and areas around it.

The Potential Natural Vegetation Map of Tokyo Metropolis can be viewed and downloaded via the website of Natural Environment Division, Bureau of Environment, Tokyo Metropolitan Government.


Figure 2. Potential Natural Vegetation Map of Tokyo and Regional Parts
Even within the same association/community indicated by the Potential Natural Vegetation Map of Tokyo, vegetation varies depending on micro topography. Distribution patterns of potential natural vegetation can serve for reference with regard to vegetation suitable of the micro topography of the planting site. Accordingly, such diagrams by regional part shown on page 14 are shown on pages 15-21.

Table. Distribution of potential natural vegetation (Central part of the Tokyo Wards Area)

<table>
<thead>
<tr>
<th>№</th>
<th>Name of association / community</th>
<th>Estimated environmental conditions for occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Japanese white oak (Quercetum myrsinaefolii), typical subass.</td>
<td>- Plateau surfaces on relatively flat loamy soil</td>
</tr>
</tbody>
</table>
| 2 | Japanese white oak (Quercetum myrsinaefolii), subass. of Japanese zelkova (Zelkova serrata) | - Terrace scarps  
- Adequately wet to moist eutrophied lands covered by kuroboku (charcoal fracture) soil, such as depressions and small valleys |
| 3 | Shear grass-Japanese alder (Carici dickinsii-Alnetum japonicae) | - Swamps of extremely poor drainage with shallow soil and surface water |
| 4 | Japanese ardisia-Sudaji (Ardisio-Castanopsietum sieboldii) | - East margins of plateaus  
- Convex south-facing dry locations |
| 5 | Machilus-Japanese tassel fern (Polysticho-Perseetum thunbergii) | - Alluvial lowlands along the Tokyo Bay  
- Sunken slopes at the lower ends of plateaus piled up with colluvial deposit or alluvial soil |
| 6 | Japanese spindle tree-Japanese pittosperm (Euonymo-Pittosporetum toriba) | - Areas under intense influence of salt winds  
(lands developed in protrusion into the Tokyo Bay, such as the Ariake area and Yumenoshima) |
| 7 | Canals | - |

* Any local vegetation estimated to consist of a Japanese spindle tree-Japanese pittosperm (Euonymo-Pittosporetum toriba) association of 6 should be replaced with a machilus-Japanese tassel fern (Polysticho-Perseetum thunbergii) association of 5. (Rationale: An area in which laying an appropriate planting basis allows a machilus-Japanese tassel fern association to form.)

Source: Vegetations of the Tokyo Metropolis (Okutomi et al., 1987)
[Eastern Part of the Tokyo Wards Area]

Figure. Distribution pattern of potential natural vegetation (Eastern Part of the Tokyo Wards Area)

Table. Distribution of potential natural vegetation (Eastern Part of the Tokyo Wards Area)

<table>
<thead>
<tr>
<th>№</th>
<th>Name of association community</th>
<th>Estimated environmental conditions for occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Japanese white oak (Quercetum myrsinaefoliae) typical subass.</td>
<td>• Plateau surfaces on relatively flat loamy soil</td>
</tr>
</tbody>
</table>
| 2  | Japanese white oak (Quercetum myrsinaefoliae), subass. of Japanese zelkova (Zelkova serrata) | • Terrace scarps  
• Adequately wet to moist eutrophied lands covered by kuroboku (charcoal fracture) soil, such as depressions and small valleys |
| 3  | Shear grass-Japanese alder (Carici dickinsii-Alnetum japonicae)      | • Swamps of extremely poor drainage with shallow soil and surface water                                      |
| 4  | Japanese ardisia-Sudajii (Ardisio-Castanopsietum sieboldii)         | • East margins of plateaus  
• Convex south-facing dry locations                                                                            |
| 5  | Machilus-Japanese tassel fern (Polysticho-Perseetum thunbergii)     | • Alluvial lowlands along the Tokyo Bay  
• Sunken slopes at the lower ends of plateaus piled up with colluvial deposit or alluvial soil |
| 6  | Japanese spindle tree-Japanese pittosprum (Euonymo-Pittosporetum toriba) | • Areas under intense influence of salt winds  
(lands developed in protrusion into the Tokyo Bay, such as the Ariake area and Yumenoshima) |
| 7  | Canals                                                             | -                                                                                                           |

* Any local vegetation estimated to consist of a Japanese spindle tree-Japanese pittosprum (Euonymo-Pittosporetum toriba) association of 6 should be replaced with a machilus-Japanese tassel fern (Polysticho-Perseetum thunbergii) association of 5.

(Rationale: An area in which laying an appropriate planting basis allows a machilus-Japanese tassel fern association to form.)

Source: Vegetations of the Tokyo Metropolis (Okutomi et al., 1987)
### Table. Distribution of potential natural vegetation (Western Part of the Tokyo Wards Area)

<table>
<thead>
<tr>
<th>№</th>
<th>Name of association / community</th>
<th>Estimated environmental conditions for occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Japanese white oak (<em>Quercetum myrsinaefolii</em>), typical subass.</td>
<td>• Plateau surfaces on relatively flat loamy soil</td>
</tr>
<tr>
<td>2</td>
<td>Japanese white oak (<em>Quercetum myrsinaefolii</em>), subass. of Japanese zelkova (<em>Zelkova serrata</em>)</td>
<td>• Terrace scarps&lt;br&gt;• Adequately wet to moist eutrophied lands covered by kuroboku (charcoal fracture) soil, such as depressions and small valleys</td>
</tr>
<tr>
<td>3</td>
<td>Shear grass-Japanese alder (<em>Carici dickinsii-Alnetum japonicae</em>)</td>
<td>• Swamps of extremely poor drainage with shallow soil and surface water</td>
</tr>
<tr>
<td>4</td>
<td>Japanese ardisia-Sudajii (<em>Ardicso-Castanopsietum sieboldii</em>)</td>
<td>• East margins of plateaus&lt;br&gt;• Convex south-facing dry locations</td>
</tr>
<tr>
<td>5</td>
<td>Machilus--Japanese tassel fern (<em>Polysticho-Perseetum thunbergii</em>)</td>
<td>• Alluvial lowlands along the Tokyo Bay&lt;br&gt;• Sunken slopes at the lower ends of plateaus piled up with colluvial deposit or alluvial soil</td>
</tr>
<tr>
<td>-</td>
<td>Amur silver-grass (<em>Miscanthetum sacchariflori</em>) etc.</td>
<td>* The existing vegetation serves as potential natural vegetation as it is.</td>
</tr>
</tbody>
</table>
Table. Distribution of potential natural vegetation (Eastern Tama)

<table>
<thead>
<tr>
<th>№</th>
<th>Name of association / community</th>
<th>Estimated environmental conditions for occurrence</th>
</tr>
</thead>
</table>
| 1  | Japanese white oak (Quercetum myrsinaefolii), subass. of Japanese zelkova (Zelkova serrata)      | • Terrace scarps  
• Adequately wet to moist eutrophied lands covered by kuroboku (charcoal fracture) soil, such as depressions and small valleys |
| 2  | Japanese white oak (Quercetum myrsinaefolii), typical subass.                                  | • Flat surfaces of plateaus  
• Gentle slopes on hills |
| 3  | Japanese white oak (Quercetum myrsinaefolii), subass. of Japanese fir (Abies firma)             | • Slightly elevated areas on plateaus |
| 4  | Japanese red pine (Pinus densifora) community                                                  | • Land with largely disturbed top soil in hills |
| 5  | Shear grass-Japanese alder (Carici dickinsii-Alnetum japonicae)                                 | • Places where stagnant water is constantly present, such as around ponds/marsh and along former riverbeds |
| 6  | Siebold's viburnum- Japanese alder (Viburno sieboldii-Alnetum japonicae)                       | • Paddy fields in alluvial lowlands along the Tama River  
• Valleys in hilly areas |
| 7  | Amur silver-grass (Miscanthetum saccariflori), etc.                                            | • Riversides along the Tama River, the Aki River, the Asa River, and other rivers |

* Any local vegetation estimated to consist of a Japanese red pine community of 4 should be replaced with a Japanese white oak (Quercetum myrsinaefolii) association typical subassociation of 2.  
(Rationale: An area in which laying an appropriate planting basis allows the Japanese white oak association to form a typical subassociation.)
### Table. Distribution of potential natural vegetation (Western Tama)

<table>
<thead>
<tr>
<th>№</th>
<th>Name of association / community</th>
<th>Estimated environmental conditions for occurrence</th>
</tr>
</thead>
</table>
| 1  | Japanese fir- Japanese star anise (Illicio-Abietetum firmae)         | • Lower parts of mountains at altitudes of 350-700 m  
• Mountainside-to-ridge areas with the exception of Japanese zelkova (Zelkova serrata)-Japanese maple (Acer palmatum) association zones |
| 2  | Japanese maple- Japanese zelkova (Aceri-Zelkovetum)                  | • Areas along valleys or mountain streams at altitudes of approx. 350-900 m  
• Places where gravels are present along mountain streams.  
• Steep slopes along valleys and other places with little soil deposition |
| 3  | Japanese white oak (Quercetum myrsinaefoliae), subass. of Japanese zelkova (Zelkova serrata) | • Terrace scarps  
• Adequately wet to moist eutrophied lands covered by kuroboku (charcoal fracture) soil, such as depressions and small valleys  
• Areas along mountain streams in lower parts of mountains |
| 4  | Japanese white oak (Quercetum myrsinaefoliae), subass. of Japanese fir (Abies firma) | • Slightly elevated areas on plateaus |
| 5  | Japanese white oak (Quercetum myrsinaefoliae), typical subass.      | • Flat surfaces of plateaus  
• Gentle slopes on hills |
| 6  | Siebold's viburnum- Japanese alder (Viburno sieboldii-Alnetum japonicae) | • Valleys in hilly areas |
| 7  | Reed species (Phragmitetum japonicae) etc.                          | • Riversides along the Tama River, the Aki River, the Asa River, and other rivers |

Source: Vegetations of the Tokyo Metropolis (Okutomi et al., 1987)
[Okutama] (Central Okutama)

Figure. Distribution pattern of potential natural vegetation (Central Okutama)

Table. Distribution of potential natural vegetation (Central Okutama)

<table>
<thead>
<tr>
<th>№</th>
<th>Name of association / community</th>
<th>Estimated environmental conditions for occurrence</th>
</tr>
</thead>
</table>
| 1  | Japanese star anise- Japanese fir (Illicio-Abietetum firmae) | • Lower parts of mountains at altitudes of approx. 350-700 m  
• Mountainside-to-ridge areas with the exception of Japanese zelkova (Zelkova serrata)-Japanese maple (Acer palmatum) association zones |
| 2  | Japanese maple-Japanese zelkova (Aceri-Zelkovetum) | • Areas along valleys or mountain streams at altitudes of approx. 350-900 m  
• Places where gravels are present along mountain streams.  
• Steep slopes along valleys and other places with little soil deposition |
| 3  | Japanese fir- Japanese blue beech (Abies firma-Fagus japonica) community | • Mountainside slopes at altitudes of approx. 700-1,000 m |
| 4  | Japanese white oak (Quercetum myrsinaefoliae), subass. of Japanese zelkova (Zelkova serrate) | • Lower parts of mountains along mountain streams at altitudes of up to approx. 350 m |
| 5  | Japanese white oak (Quercetum myrsinaefoliae), subass. of Japanese fir (Abies firma) | • Areas from mountainside slopes at lower parts of mountains to ridges at altitudes of up to approx. 350 m |
| 6  | Southern Japanese hemlock - three-leaved eastern azalea (Rhododendro-Tsugetum sieboldii) | • Areas along ridges or steep rocky slopes in beech (Fagus crenata) region at altitudes of ≥approx. 700 m |
| 7  | Yashabushi (Alnus firma) community | • Steeply inclined cut slopes in bedrock areas near mountains |

* Any local vegetation estimated to consist of a yashabushi (Alnus firma) community of 7 should be replaced with a Japanese white oak (Quercetum myrsinaefoliae), subass. of Japanese zelkova (Zelkova serrata) of 4, Japanese maple- Japanese zelkova (Aceri-Zelkovetum) of 2, or Southern Japanese hemlock - three-leaved eastern azalea (Rhododendro-Tsugetum sieboldii) of 6, according to the altitude of the planting site.  
(Rationale: An area in which laying an appropriate planting basis allows the aforementioned plant communities to occur according to the altitude of the planting site.)

* No example selections of component species for the beech (Fagus crenata) region are given in Table 3 (page 12) or Table 4 (page 13). Because native species are abundant around the planting site, vegetation around the planting site can serve for reference purposes for the selection of native species.

Source: Vegetations of the Tokyo Metropolis (Okutomi et al., 1987)
[Okutama] (Western Okutama)

Figure. Distribution pattern of potential natural vegetation (Western Okutama)

Table. Distribution pattern of potential natural vegetation (Western Okutama)

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<th>№</th>
<th>Name of association / community</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Abelia-Beech (Abelio-Fagetum crenatae), subass.of taimingasamodok (Cacalia yatabei)</td>
<td>• Ridges to relatively gentle mountainside slopes covered by kuroboku (charcoal fracture) soil</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Areas covered by kuroboku (charcoal fracture) soil in the vicinities of the ridges of Mt. Odakesan-Mt. Gozenyama-Mt. Mitousan</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Areas covered by kuroboku (charcoal fracture) soil in the vicinities of the ridges of Mt. Mitousan-Mt. Makiyoseyama-Mt. Dohyodake</td>
</tr>
<tr>
<td>2</td>
<td>Miyamakumawarabi-shioji (Dryopterido-Fraxinetum spathianae)</td>
<td>• Places rich in gravels of various sizes along mountain streams or on sunken slopes at altitudes of ≥approx. 900 m</td>
</tr>
<tr>
<td>3</td>
<td>Three-leaved eastern azalea-southern Japanese hemlock (Rhododendro-Tsugetum sieboldii)</td>
<td>• Beech (Fagus crenata) regions on rocky slopes along ridges or on steep slopes at altitudes of ≥approx. 700 m</td>
</tr>
<tr>
<td>4</td>
<td>Abelia-Beech (Abelio-Fagetum crenatae), typical subass.</td>
<td>• Mountainside slopes at altitudes of approx. 1,000-1,700 m</td>
</tr>
<tr>
<td>5</td>
<td>Japanese fir-Japanese blue beech (Abies firma-Fagus japonica) community</td>
<td>• Mountainside slopes at altitudes of approx. 700-1,000 m</td>
</tr>
<tr>
<td>6</td>
<td>Japanese star anise-Japanese fir (Illicio-Abietetum firmae)</td>
<td>• Lower parts of mountains at altitudes of approx. 350-700 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Mountainside-to-ridge areas with the exception of Japanese zelkova (Zelkova serrata)-Japanese maple (Acer palmatum) association zones</td>
</tr>
<tr>
<td>7</td>
<td>Japanese maple-Japanese zelkova (Aceri-Zelkovetum)</td>
<td>• Places along valleys or mountain streams at altitudes of approx. 350-900 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Places where gravels are present along mountain streams.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Steep slopes along valleys and other places with little soil deposition</td>
</tr>
<tr>
<td>8</td>
<td>Kometsuga-Japanese fir (Tsuga diversifolia-Abies homolepis) community</td>
<td>• Mountainside slopes at altitudes of approx. 1,700-1,800 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Rocky slopes along ridges at altitudes of ≤approx. 1,450 m</td>
</tr>
<tr>
<td>9</td>
<td>Marie’s fir-Weitch’s silver fir (Abietetetum mariesio-veitchii), subass. of kometsuga (Tsuga diversifolia)</td>
<td>• Areas around Mt. Kumotoriyama at altitudes of ≥approx. 1,800 m</td>
</tr>
<tr>
<td>10</td>
<td>Japanese spiraea-Miyako-zasa (Spiraeo-japonicae-Sasetum nipponicae)</td>
<td>• Wind-swept sites around Mt. Kumotoriyama</td>
</tr>
</tbody>
</table>

*No example selections of component species for the beech (Fagetea crenatae) region are given in Table 3 (page 12) or Table 4 (page 13). Because native species are abundant around the planting site, vegetation around the planting site can serve for reference purposes for the selection of native species.*