



Title	Flowers along streets : benefits and resident involvement
Author(s)	TODOROVA, Assenna Bojilova
Citation	Journal of the Graduate School of Agriculture, Hokkaido University, 71(2), 43-121
Issue Date	2005-02
Doc URL	<a href="http://hdl.handle.net/2115/5644">http://hdl.handle.net/2115/5644</a>
Type	bulletin (article)
Note	Doctoral thesis submitted to the Graduate School of Agriculture, Hokkaido University (2004)
File Information	71(2)_1.pdf



[Instructions for use](#)

## Flowers along streets: benefits and resident involvement<sup>1</sup>

**Assenna Bojilova TODOROVA**

(Research Group of Horticultural Science and Landscape Architecture,  
Graduate School of Agriculture, Hokkaido University)

(Received 2004.10.5/Accepted 2004.11.29)

### Contents

<b>I. Introduction</b> .....	44
A. Review of literature .....	44
B. Perspectives for research on flowers as an element of street-planting models and objectives of this study .....	47
<b>II. Flower-planting activities in Japan</b> .....	49
A. Flower-planting activities carried out voluntarily by citizens .....	49
B. Street flower-planting in Hokkaido, including Sapporo .....	51
C. Mostly used flower species and planting patterns in Hokkaido and Sapporo .....	53
<b>III. Evaluation of street-planting models in Sapporo</b> .....	54
A. Introduction and purpose of the study .....	54
B. Methodology .....	55
C. Results .....	58
D. Discussion .....	66
<b>IV. Cross-cultural comparison of preferences for street-planting models between     Japanese and Bulgarian respondents</b> .....	69
A. Introduction and purpose of the study .....	69
B. Methodology .....	70
C. Results .....	70
D. Discussion .....	77
<b>V. Analysis of attitudes towards street flowers in Sapporo</b> .....	79
A. Introduction and purpose of the study .....	79
B. Methodology .....	80
C. Results .....	81
D. Discussion .....	88
<b>VI. Structure and characteristics of resident involvement in street flower-planting and     maintenance</b> .....	89
<b>Part I: A survey of residents from two areas in Sapporo</b> .....	89
A. Introduction and purpose of the study .....	89
B. Methodology .....	90
C. Results .....	94

---

<sup>1</sup> Doctoral thesis submitted to the Graduate School of Agriculture, Hokkaido University (2004)

D. Discussion .....	99
<b>Part II: A survey of organisations involved in street flower-planting .....</b>	<b>101</b>
A. Introduction and purpose of the study .....	101
B. Methodology .....	101
C. Results .....	102
D. Discussion .....	109
<b>VII. Conclusions .....</b>	<b>110</b>
A. The benefits of having flowers on the streets.....	110
B. Preferences for street-planting models and cultural differences .....	111
C. The benefits of citizens involvement in street flower-planning and maintenance .....	111
D. Suggestions for future promotion of street flower-planting involving citizens ..	112
Acknowledgements .....	114
References .....	115
<b>Appendix A – Photomontage simulations used in the evaluation of street-planting models .....</b>	<b>119</b>

## I. Introduction

### A. Review of literature

#### 1). Natural environment and human well-being

Contact with nature may benefit health and extensive research devoted to the importance of the natural environment for human health has been reviewed by Frumkin (2001). People derive various benefits from plants in urban areas. Ulrich and Parsons (1992) divide their review of findings related to urban vegetation into four parts: 1) aesthetic benefits; 2) effects on psychological well-being, including stress reduction; 3) physiological influences; and 4) health-related benefits. Ulrich (1984) Ulrich and Parsons (1992) and Relf (1992) have found that people derive benefits from plants not only from active contact with them such as gardening, but also through physically passive experiences such as viewing flowers and greenery. Kaplan (1992) showed that the opportunity to see natural elements, such as trees and flowers, is a positive factor in work environment satisfaction and enthusiasm for work. In a survey of more than 2,000 randomly selected U.S. households, 40% agreed with the statement: “Being around plants makes me feel calmer and more relaxed” (e.g. Butterfield and Relf, 1992). Since most views of nature elicit positive feelings, reduce fear in stressed subjects, hold interest, and may block or reduce stressful thoughts, they might also foster recovery from anxiety or stress, as found by Ulrich (1984) and Honeyman (1992). Indeed, Ulrich’s (1984) investigations into the restorative effects of natural views on surgical patients demonstrated the positive therapeutic influence of natural scenery. In recent years much attention has been paid to the link between an attractive environment and its therapeutic value to patients (e.g. Radley, 1997;

Stoneham, 1997) and horticultural therapy is even recommended by psychologists for treatment of certain psychiatric disorders (e.g. Neuberger, 1992). However a scarce amount of research has been devoted to the benefits people derive from small vegetation, including flowers.

Landscape preferences have been widely discussed in the field of landscape architecture and environmental psychology. The overview of research findings concerning human responses to natural and urban landscapes provided by Ulrich (1986) shows that most of the reviewed works concern issues related to preferences for natural landscapes, forests, urban versus natural scenes, and the importance of vegetation in urban landscapes. Furthermore, researchers from various countries have investigated cultural and sub-cultural (Buhyoff and Wellman, 1983; Talbot and Kaplan, 1984; Tips and Savasdisara, 1986abc; Kaplan and Herbert, 1987; Yang and Kaplan, 1990; Yu, 1995) ethnic (Kaplan and Talbot, 1988) and group (Buhyoff et al., 1978; van den Berg et al., 1998; Brush et al. 2000) differences in preference. Factors, such as personality (Macia, 1979; Abelo and Bernaldez, 1986) environmental orientation (Kaltenborn and Bjerke, 2002) and educational background (Kent, 1993) have also been reported to influence preference. Cultural differences in landscape appreciations have been found between Asian residents and Western tourist (Tips and Savasdisara, 1982a), Korean residents and Western visitors (Yang and Kaplan, 1990) and Chinese residents and American students (Yu, 1995).

## **2). Importance of urban vegetation, in particular street trees and roadside vegetation**

Analysis of the literature (Ulrich, 1986; Smardon, 1988; Ulrich and Parsons, 1992) shows that urban vegetation contributes to human well-being in various aspects and street trees have been given much attention, as an important part of urban vegetation. Some studies (e.g. Anderson and Cordell, 1988) concentrate on the economic benefits of urban vegetation, others point out the role of the psychological and perceptual functions including visual, sensory and symbolic aspects (e.g. Smardon, 1988; Kaplan, 1992). As Smardon (1988) concludes, all forms of vegetation contribute to visual improvement – trees break up continuous building facades and provide delineation of space, shrubs anchor structures to the ground, and grass and ground cover help to define pavement edges. However, most research has been devoted to the role of trees in street vegetation, but street flowers, which potentially can also provide benefits for people, lack investigation. Therefore the traditional image of street vegetation consists of trees and medium- or large-sized shrubs. It has been shown that the presence of trees is highly important and valuable for the urban environment and streetscape (e.g. Smardon, 1988; Sommer et al., 1990; Sommer et al., 1992). Studies concerning public attitudes to street trees have been conducted and the overwhelming outcome is that respondents strongly value trees in urban streets (e.g. Anderson and Cordell,

1988; Smardon, 1988). This is based on a complex of functional, ecological, social and psychological attributes.

Much of our time is spent on streets. Some streets are not attractive to pedestrians and drivers, whereas others are equally appealing to both users. According to Jacobs (1997) to be categorised as best, a street should be comfortable, with places to walk at a leisurely pace and in safety, and have something to engage the eyes. Antupit et al. (1996) have reported that vegetation comes at first priority in the list of qualities that great streets should include. Other findings from research in the U.S.A. have demonstrated the positive affects of naturalistic roadways (Kent, 1993; Parsons et al., 1998) greater appreciation of freeway roadsides having trees (Wolf, 2003) and even that the roadside environment can influence route choice (Ulrich, 1974).

In studies regarding street vegetation models (e.g. Fujiwara and Tashiro, 1984; Masuda et al., 1989) respondents showed a preference for tall trees in combination with ground cover, or tall trees in combination with low trees. On the whole, a combined type of street-planting model was favoured, as also found by Abe et al. (1990) but whether there is any difference in preferences for the spaces found beneath trees, or what it is best to combine with trees has not yet been investigated. Ichihashi et al. (2000) found that attitudes to street vegetation models differ between pedestrians and drivers; for example, trees or shrubs at knee height improve the sidewalk for pedestrians but reduce the information available to drivers. Findings by Shimomura (1994) concerning uses of pedestrian space showed that street planting could increase the used proportion of a pedestrian strip by 15%, as a result of creating a safer and more comfortable environment for pedestrians, and helping to separate them from traffic. This effect was more frequently observed in street vegetation models of a combined type, consisting of trees, shrubs and ground cover, than in single type formations consisting only of trees or shrubs. As the reviewed works show, people find combined types of street vegetation more attractive than only single trees, but the combinations they find most attractive have so far not yet been investigated in detail. Neither did the reviewed works include street flower issues.

Other studies have discussed issues related to the management of front yards and their contribution to the streetscape in residential areas. Schroeder and Cannon (1987) concluded that street trees contributed most to the visual quality of a street where there were few yard trees and least where there were many yard trees. They suggested that programs designed to encourage homeowners to plant and care for trees in their front yards might yield aesthetic benefits to the public. The findings of Zmyslony and Gagnon (1998) have shown that the management of front-yard vegetation and nonvegetated areas in a street section is not a random process but there is a resident interaction of mimicry type, where nearest front yards share significantly more common characteristics than farthest yards. In a study carried out in Megumino town, Hokkaido by Kawane et al.

(2000) a survey on residents' attitudes to their gardens revealed that some people were aware of the contribution of their gardens to the streetscape. Those were the people motivated to tend their gardens not merely as a means of supplying food but rather as a source of psychological benefits and human interchange. Properly encouraged, the contagious mode of landscape management of front yards can significantly contribute in enhancing the aesthetic quality of streets.

### **3). Benefits of resident involvement**

Public participation issues have been widely discussed in the field of city planning and environmental management (McPherson and Johnson, 1988; Kaplan and Kaplan, 1989; Jones, 1999; Taylor, 2000; Manns and Wood, 2002). Pinfield (2000) pointed out that enhancing public participation involves improved comprehension, better communication within and outside the authority, development of capacity for public participation and strengthening connections. In recent years residents have been involved in various projects (e.g. Matsumura, 1996; Hayashi, 2000, Hirata, 2000) and many landscape professionals and city planners have realized that consulting public's opinion is essential for the successful fulfillment of many urban projects.

### **4). Interest in flowers**

Humans have been using flowers since the old days. We use flowers on any kind of occasion from the happiest ones to the saddest ones, and all the significant events in our lives are marked with flowers. Flowers have been an inspiration for poets, artists and designers and are subject of admiration for many people. However there is not much scientific proof of the benefits of flowers.

In one of the few studies concerning aesthetic response to flowers, for the majority of the respondents a positive memory from their visit to Morton Arboretum, Illinois, U.S., was the attractive flower scenery (Schroeder, 1986). In a UK survey concerning preferences for woodland edges in urban park areas, Jorgensen et al. (2002) found that wood edge treatment with flowers was most preferred. In another survey assessing the scenic beauty of roadside vegetation in northern England (Akbar et al., 2003) the most preferred roadside vegetation type was a combination of grass and flowering herbs. In Japan, people also show interest in flowers, as demonstrated by a case study in Kobe (Iwamura and Yokohari, 2001) where local residents more actively participated in the maintenance of parks with flower beds than in parks without them. It could therefore be concluded that people are attracted to flowers and in one way or another flowers can benefit human well-being.

## **B. Perspectives for research on flowers as an element of street-planting models and objectives of this study**

Trees have been given much attention in the field of landscape research,

however flowers and other small vegetation might have been neglected since their contribution to the microclimate alteration is insignificant compared to those of large-sized vegetation. On the other hand, flowers and other small plants could seem easily damageable compared to trees and their maintenance could seem expensive to city administration due to short flowering or existence period and need of seasonal cares. But since people can derive benefits from plants simply by passive viewing of vegetation (Ulrich and Parsons, 1992) flowers and other small vegetation are an important factor that has influence on human well-being and health and should not be neglected. Landscape architects, planners and urban developers should find ways of enhancing the use of flowers and small vegetation in the street.

The use of flowers or other small plants in the streets with or without trees is related to the physical conditions of the site, plant species' characteristics (suitable or not for planting in the street, duration of flowering period etc.), residents' preferences for species, colours and planting models, and possibilities to foster public participation in planting and maintenance activities.

Undoubtedly trees are of great importance to the streetscape, but landscape architects should search for other possibilities of enhancing the aesthetic value of urban areas and especially streets. Flowers seem likely to work well but more research is needed. Flowers do not need a lot of space to grow but contribute a lot to the aesthetic quality of the street. They are diverse in shape, height, colours and flowering periods, and compared to trees, are not very difficult to plant and maintain. Furthermore, there is an opportunity to get residents involved in flower-planting and maintenance activities more easily than in tree planting. Though the functions of street flowers are mainly aesthetic, to some extent they are related to those of large sized greenery and are not to be underestimated (Figure 1). Different kinds of flowers, small shrubs or ground cover could help significantly in improving the streetscape in urban areas. Colourful combinations of flowers could contribute to the beautification of the streets, breaking the streetscape monotony and the usually grey tones of the streetscape. Moreover, often in cities there is not enough space to plant trees on the street, or if trees are planted there is usually no vegetation beneath them on the sidewalk or at the level of people's field of view. The presence of flowers or other small vegetation, where trees and shrubs can not be planted, can be provided by the use of plant containers put directly into the ground. They can be used to form barriers, visual screening and soften architectural elements (Gibbons and Oberholzer, 1992). Searching for skilful use of both street furniture and plants, could be a challenge for the designers from various fields. Even when trees are present, aesthetic qualities of an urban street enhance if the space beneath trees is used to plant small shrubs, flowers or ground cover, adding visual diversity to the streetscape and urban environment. Of course, using flowers has some disadvantages as well. Some of them need to be changed or cut when the

Street vegetation functions

Traffic	Local environment and microclimate	Space	Scenery	Local expression	Educational	Psychological
shading	air purification	clarification of city sections/blocks	symbolic	expression of a place	seasonal experience	stress-reducing
guiding	noise reduction	separating	sense of sight/guiding	expression of a seasonal changes	educational (learning about plants by name tags and	
separating	preservation of nature	visual effects	decorative	emphasising natural features and climate	experience variety of colours and colour combinations	
framing	sun radiation adjustment	providing shelter	colourful		experience variety of plant species	
providing feeling of safety	windbreak		unifying		experience variety of arrangements	
connective			organic (sense of feeling, fragrance, colour)			
drawing			corrective			
			framing			

shows street flowers potential functions

Adapted from Shimomura (1994)

Figure 1 Street vegetation functions.

flowering period is over; annuals need to be planted every year, and so on. However, if the species are properly chosen and if citizen participation could be obtained, such disadvantages might be reduced.

In particular, this study aims to analyse preferences for street-planting models and the factors that are most influential in deciding preferences. In this regard an additional aim is to investigate whether flowers are appreciated as an element of street flower-plantings and what colours and heights are most preferred. Another aim was to analyse the influence of country of origin on preferences for street-planting models and in this regard a cross-cultural comparison between subjects from Sapporo and Sofia, Bulgaria was made.

Another aim is to analyse residents attitudes towards street flowers and their willingness to plant and maintain flowers on the streets as well as their opinions on various issues related to street flowers. Furthermore, the study attempts to investigate the motivations of those who have been planting and maintaining street flowers and also to survey organisations which are involved in street flower-planting and maintenance.

## II. Flower-planting activities in Japan

### A. Flower-planting activities carried out voluntarily by citizens

As introduced in Chapter I, among the studies demonstrating interest in flowers, some were carried out in Japan (e.g. Iwamura and Yokohari, 2001). It seems that recently in Japan there has been an increasing interest in flowers and many Japanese citizens are involved in street flower-planting. II gives a brief overview of the flower-planting activities in Japan, particularly in Sapporo,

Hokkaido.

Japanese people have always been very appreciative of nature and in the recent years there has been an increased interest towards greenery and flowers. The variety and availability of ornamental flower species also contribute to the increased use of flowers in Japanese private gardens, public parks and streets and, therefore, people have been talking about a “gardening boom” in the recent years. The International Garden and Greenery Exposition, held in Osaka in 1990 is thought to have had a significant influence on the interest in gardening and flower-planting in Japan. Nowadays in many Japanese cities there are flower-planting activities voluntarily carried out by citizens. According to professor Nakase Isao from the Himeji Institute of Technology, activities related to flower-planting and carried out by citizens first started in 1952 in Matsumoto city, Nagano prefecture (e.g. O-Bay, 2003). Even though there were people who felt uncertain about the outcome of such activities, the flower-planting movement spread all over Japan and three years later a federation called “Zen Nippon hana ippai” (More flowers all over Japan) was established. Yet another event, The Japan flora 2000, held in Awaji island, Kansai area might also have had an influence on the promotion of such activities.

Half a century has passed since volunteer flower-planting activities started in Japan. Starting from the Western part of Japan, the movement has spread all over the country. An internet search (<http://www.yahoo.co.jp/>) for “furawa rodo” (flower road) opens 4180 pages related to decorating roads with flowers in many Japanese cities. Of course some of them contain information not directly related to street flower-planting. Another search for “hana dsukuri suishin” (promotion of flower-planting) opens 65 pages related to the beautification of urban areas with flowers all over Japan. Yet another search for “hana no machidsukuri” (community planning with flowers) opens 1650 pages related to the subject. This is evidence that in many Japanese cities there are activities carried out voluntarily by citizens who want to decorate their streets and plazas with flowers. In most of the cases flower-planting activities are carried out by local residents in partnership with administration. Very often elementary school students also participate. Volunteer activities in street flower-planting are found in many Japanese prefectures - Hoyogo, Gifu, Kyoto, Mie, Akita, Miyagi, Yamagata, Ibaraki, Saitama, Toyama, Ishikawa, Nagano, Shizuoka, Aichi, Kyoto, Okayama, Oita, Kanagawa. The information found in most of the home pages revealed that the common concept of decorating streets with flowers was to contribute to the cityscape beautification and to make streets pleasant to walk, look at and stop at, for both pedestrians and drivers. The psychological benefits to people derived from viewing flowers, such as providing relaxation and refreshment to drivers or pedestrians who pass by flower decorated roads were also considered. As other benefits were mentioned street and city beautification, opportunity for communication among local residents, and making people aware

of seasonal changes.

### **B. Street flower-planting in Hokkaido, including Sapporo**

The phenomenon of “gardening boom” is pronouncedly evident in the northern regions of Japan, particularly in Hokkaido which contrasts to the main island with its colder climate and newly established culture and traditions. Since 1952 till present at Odori park, situated in the center of Sapporo, professional companies have been creating beautiful flower parterres, which is considered to have influenced the interest in flowers shown by many citizens of Sapporo. Yet another event which might have had an influence on the interest in flowers in Sapporo is the “Sapporo flower and greenery exposition” held in 1986 in Yurigahara park, situated in the Northern district of the city. Recently there has been a significant use of flowers all over Hokkaido not only in parks, private gardens and tourist spots but in the streets of many cities, including Sapporo. Furthermore, there is evidence of residents participation in street flower-planting and maintenance (e.g. Flower master newsletter, 1999; Forum of the road repair cases from the North, 2000; Satsunae plan for the promotion of greenery; Shinkawa cosmos road pamphlets, 1998). The pattern of participation varies – some residents individually plant flowers in front of their homes and the surroundings, others are members of volunteer organizations or participate through the supervision of the neighbourhood associations. In most instances those participating are supported by the administration (Hokkaido bureau for Construction and Development or city administration), which usually provides flower seedlings or funds. Additional funds are gathered by hospitals, shops and banks situated along the flower-decorated streets. In Hokkaido, where heavy snowfalls persist throughout a long winter season, the maintenance of shrubs or hedges along streets is difficult and costly, therefore in many ways flowers offer an obvious advantage to shrubs or hedges.

In 1973 the Hokkaido Community Activities Promotion Association and Mainichi newspaper organized the “Hokkaido Hana Ippai” (More flowers in Hokkaido) contest. In 2001 a competition sponsored by the Hokkaido government and Doushin sport newspaper called “kita no machidukuri shou” (The North Community Planning Prize) was established. The aim of this event is to promote townscape beautification by using flowers or greenery (Attractive North Community Planning, 2003). Flowers planted along the sidewalk are among the features that pleasantly catch a pedestrian’s eye, and can be seen on many streets in Sapporo. Recently there have been a number of examples of resident participation in street flower-planting and maintenance in Sapporo as demonstrated by The Satsunae’s Plan for the Promotion of Greenery and The Shinkawa Cosmos Road pamphlets from 1998. It is evident that people appreciate flowers and are aware of their contribution to the aesthetic quality of streetscapes, however, a better understanding of their attitudes towards and preferences for street flowers

colour and height is needed in order to promote street flower-planting.

In Hokkaido, in 1993 a Flower Master System was established with the purpose of promoting the use of flowers in a way to contribute to the aesthetic qualities of cityscapes. People who become flower masters are those who have the knowledge and skill to deal with flowers, they voluntarily become leaders in activities related to flower community planning. To become a flower master it is necessary to take an exam. After taking the exam one can be a flower master for 3 years and if they want to continue they should take lectures and refresh their knowledge. This system is available only in Hokkaido.

Sapporo is a relatively new city, and compared to other cities in Japan there is much more space for street plants because even in residential areas the streets and sidewalks are wide. Trees have been planted on many streets in Sapporo. *Sorbus commixta* is the tree species which has the highest total number of species planted all over the Sapporo city, and *Robinia pseudoacacia* is the most frequently used species in the central area (Table 1). Street flowers are used in many districts in Sapporo, planted by the residents who live nearby, by volunteer groups or by the city administration. Furthermore, there is evidence that many people are interested in planting and maintaining flowers or small shrubs in the street flower beds. Some of these people are organised into groups, while others act individually, just in front of their own dwellings.

In the “Ordinance of promoting greenery in Sapporo city”, existing from 1977

**Table 1** Street trees in Sapporo

April, 1st 1999

Unit: tree

species	city roads / prefectural roads											national highways	total	
	choo	kita	higasi	shiroishi	atsubetsu	toyohira	kyoda	minami	nishi	teine	subtotal			
<i>Sorbus commixta</i>	1,695	5,980	2,812	4,867	3,721	2,079	2,912	1,805	3,229	2,077	31,177	2,179	33,356	
<i>Robinia pseudoacacia</i>	4,615	3,757	2,274	4,301	2,609	2,507	985	1,047	1,588	1,013	24,696	1,880	26,576	
<i>Ginkgo biloba</i>	3,158	3,945	3,089	2,549	5,038	1,312	1,515	516	831	2,492	24,445	2,228	26,673	
<i>Acer spp.</i>	715	3,519	1,089	248	1,104	2,400	2,177	773	225	1,938	14,188	489	14,677	
<i>Platanus spp.</i>	1,836	2,646	2,248	588	1,518	800	563	142	1,017	564	11,922	463	12,385	
<i>Betula platyphylla var. jap.</i>	461	1,112	918	447	1,641	1,386	787	510	987	331	8,580	149	8,729	
<i>Prunus spp.</i>	579	1,423	500	630	246	399	612	1,772	781	607	7,549	871	8,420	
<i>Salix babylonica</i>	1,439	595	808	915	516	16	—	10	1,162	1,617	7,078	474	7,552	
<i>Ulmus davidiana var. jap.</i>	713	3,005	1,292	32	454	140	1,179	155	572	316	7,858	395	8,253	
<i>Tilia maximowicziana</i>	261	2,447	872	99	354	756	747	75	166	557	6,334	646	6,980	
<i>Sophora japonica</i>	217	670	634	514	229	511	374	320	847	666	4,982	181	5,163	
<i>Acer negundo</i>	764	636	1,168	519	73	381	13	7	8	52	3,621	567	4,188	
<i>Aesculus turbinata</i>	309	779	329	1	137	385	1,725	115	154	87	4,021	182	4,203	
<i>Alnus japonica</i>	3	1,572	333	169	—	20	39	578	266	336	3,316	13	3,329	
<i>Springa reticulata</i>	460	1,032	826	155	32	18	238	400	119	11	3,291	—	3,291	
<i>Populus nigra</i>	175	269	976	229	41	172	147	42	361	134	2,546	232	2,778	
<i>Ailanthus altissima</i>	429	581	237	—	174	99	—	2	—	—	1,522	59	1,581	
<i>Fraxinus lanuginosa</i>	209	211	603	—	6	—	—	—	207	29	1,265	—	1,265	
Other deciduous species	1,558	5,391	1,822	412	417	828	922	1,369	375	144	13,238	740	13,978	
<b>subtotal</b>	<b>19,596</b>	<b>39,570</b>	<b>22,830</b>	<b>16,675</b>	<b>18,310</b>	<b>14,209</b>	<b>14,935</b>	<b>9,638</b>	<b>12,895</b>	<b>12,971</b>	<b>181,629</b>	<b>11,748</b>	<b>193,377</b>	
large evergreen trees	<i>Picea abies</i>	15	2,189	—	2,001	251	345	345	—	25	5,171	706	5,877	
	<i>Taxus cuspidata</i>	509	1,348	112	371	106	170	3	171	70	2,916	946	3,862	
	<i>Pinus banksiana</i>	59	—	—	—	95	272	—	276	225	—	927	274	1,201
	Other evergreen species	1,533	6,670	2,894	796	840	535	342	887	380	463	15,340	2,634	17,974
	<b>subtotal</b>	<b>2,116</b>	<b>10,207</b>	<b>3,006</b>	<b>3,168</b>	<b>1,292</b>	<b>1,322</b>	<b>690</b>	<b>1,334</b>	<b>675</b>	<b>544</b>	<b>24,354</b>	<b>4,560</b>	<b>28,914</b>
<b>large trees: total</b>	<b>21,712</b>	<b>49,777</b>	<b>25,836</b>	<b>19,843</b>	<b>19,602</b>	<b>15,531</b>	<b>15,625</b>	<b>10,972</b>	<b>13,570</b>	<b>13,515</b>	<b>205,983</b>	<b>16,308</b>	<b>222,291</b>	
small trees	<i>Rhododendron spp.</i>	17,899	28,317	15,250	25,259	5,409	3,314	8,559	3,060	4,460	7,735	119,262	23,945	143,207
	<i>Rosa rugosa</i>	1,875	20,027	2,060	97	4,601	2,627	6,903	157	1,514	15,305	55,166	9,996	65,162
	<i>Syringa vulgaris</i>	1,551	2,353	490	1,134	720	172	1,618	133	95	46	8,312	876	9,188
	<i>Berberis thunbergii</i>	910	91	—	—	2,610	—	—	—	90	90	3,791	731	4,522
	<i>Pinus mugo</i>	3,910	27,034	7,331	6,923	4,785	5,135	317	784	1,474	6,122	63,815	15,208	79,023
	Other small species	15,906	35,230	23,073	9,709	5,043	897	17,498	1,645	1,032	22,703	132,736	47,196	179,932
	<b>small trees: total</b>	<b>42,051</b>	<b>113,052</b>	<b>48,204</b>	<b>43,122</b>	<b>23,168</b>	<b>12,145</b>	<b>34,895</b>	<b>5,779</b>	<b>8,665</b>	<b>52,001</b>	<b>383,082</b>	<b>97,952</b>	<b>481,034</b>
<b>total</b>	<b>63,763</b>	<b>162,829</b>	<b>74,040</b>	<b>62,965</b>	<b>42,770</b>	<b>27,676</b>	<b>50,520</b>	<b>16,751</b>	<b>22,235</b>	<b>65,516</b>	<b>589,065</b>	<b>114,260</b>	<b>703,325</b>	

and renewed in 2001 to “Conservation and Creation of greenery Ordinance in Sapporo city”, it is determined that one of the mayor’s duties is to promote citizens’ participation in tree and flower-planting in urban parks, streets and on river banks, and to organise contests among the districts. According to data from the Sapporo City office, in the period 1997 to 1999, there were 881 groups in 10 districts of the city, participating in street flower-planting and maintenance.

In the case of Sapporo city where winter is characterised with heavy snow-falls, growing shrubs or small conifer trees requires significant costs and efforts for their protection. However, many species of flowers (annuals and perennials) would not need such efforts for their winter protection due to their biological characteristics. The motivation for carrying out this research was based on the perspectives for research on flowers as an element of street-planting models and the above mentioned characteristics of Sapporo.

### C. Mostly used flower species and planting patterns in Hokkaido and Sapporo

There are several species of flowers which have been mostly planted along streets probably due to their long flowering periods, bright colours and relatively low level of maintenance. Though various species of flowers are planted according to the district, species of the genera *Tagetes*, and *Salvia* can be seen very often in Hokkaido, including Sapporo. The administration supporting the residents involved in street flower-planting often supplies *Tagetes*, *Salvia*, *Petunia* or *Begonia sp.* however the species supplied vary according to the district. For example, in the area of Tokiwa in 2002, 3000 flower seedlings of the genera *Tagetes* and *Petunia* were supplied by the Public Works Office of the Southern Ward (personal communication, May 27<sup>th</sup>, 2002). In the area of Higashi Naebo mostly *Petunia sp.* is supplied. In some areas tulip bulbs are supplied. Information about the species planted on the streets in Sapporo have been gathered by hearing of representatives of volunteer organizations and also by personal observations. Except the species from the abovementioned genera, other species that can be seen on the streets in Sapporo include those of the genera *Hemerocallis*, *Coreopsis*, *Impatiens*, *Cosmos*, *Viola*, *Helianthus*, *Hosta*. Occasionally could be seen species from the genera *Lavandula*, *Iris*, *Lobelia*, *Phlox*, *Portulaca*, *Tropaeolum*, *Hydrangea*, *Mirabilis*, *Senecio*, *Lupinus*, *Lilium*. A species very often seen at Sapporo’s streets is *Althea rosea*, however this is probably due to self reproduction. Seasonal flowers such as *Crocus sp.*, *Narcissus sp.*, *Tulipa sp.*, *Muscari sp.*, *Chrysanthemum sp.* can also be seen. At some places people have been planting even *Convolvulus sp.* tying it to the tree with thin ropes.

On some streets in Sapporo, ground cover species such as *Pachysandra sp.*, *Vinca sp.* or *Juniperus sp.* can also be found. Rarely as street-plantings can be seen shrubs from the genera *Rhododendron* or *Pinus*. Most often these species are planted in concrete flower beds near the road side or near the building side.

Planting patterns can greatly vary and at some places only one species is

planted whereas at other people mixed various species and colours. However at many places it is easy to recognise that a design scheme has been applied.

Occasionally in the street flower beds in front of some houses, there could even be seen vegetables such as tomatoes, onion, *Perilla frutescens crispata* (shiso), asparagus. This shows the eagerness of some residents to use these small semi-public pieces of land and probably many of the residents consider this land as if it was their own property. Also at many places citizens have made improvised fences around the flower beds in order to protect the vegetation planted.

The street flower beds are of short or long type. The width of the short flower beds is about 70–80cm and the length is about 100–150cm, and the width of the long flower beds is about 70–100cm and the length varies and could be from 200–250cm to 10 or more meters. Generally trees are planted in the plots available on the streets, however at some places due to space limitations or other reasons, trees are not planted and only flowers or bare land can be seen in the street flower beds.

### **III. Evaluation of street-planting models in Sapporo**

#### **A. Introduction and purpose of the study**

As mentioned in Chapter I, a few studies to date have shown that people are attracted to flowers (Schroeder, 1986; Iwamura and Yokohari, 2001; Jorgensen et al., 2002; Akbar et al., 2003). Since merely viewing vegetation could benefit human's health (Ulrich, 1984; Kaplan, 1992; Relf, 1992; Ulrich and Parsons, 1992) flowers on the streets could not only enhance the street's aesthetic quality but also provide some psychological benefits to people.

An overview of the present situation of street flower-planting activities in Japan, and particularly in Sapporo, Hokkaido was provided in Chapter II. It seems that in many areas in Japan people are interested to plant flowers on the streets and therefore it is important to better understand their preferences and attitudes regarding street flowers. The characteristics of Sapporo, which include the presence of flowers in the streets and resident involvement in street flower-planting and maintenance, provided a good opportunity to investigate preferences for different street-planting models and attitudes towards street flowers. Therefore, Chapter III concerns preferences for different street-planting models, and in particular, which of three factors: (1) tree presence; (2) plot type; or (3) flower bed elements, are most influential in deciding preferences. Detailed investigations are carried out to determine which flower bed elements and type of flowers are most preferred. In addition, were investigated attitudes towards street flowers.

## B. Methodology

### 1). Preparation of photomontage simulations and experimental design scheme

Colour photographs of street plantings, particularly with flowers, were taken during the late spring, summer and early autumn of 1999 and 2000. Photographs were taken in the city of Sapporo, most of them in the central district and mainly in residential areas. A 35mm-lens camera was used and photographs were taken from the middle of the sidewalk (width 3 – 4 m) at eye level (1.50 m) so that both sides (near the roadside and near the building) could be seen. A number of photographs were selected, scanned and processed using Adobe Photoshop, Version 4.0J. To prevent the background being an influence, all 59 photos had the same background with only the planting models differing. The base photomontage represented a typical residential district of Sapporo and was created by combining parts of different pictures since it was difficult to choose it among the available original photographs. The width of the roadway depicted in the photomontage was 6 meters and the sidewalk width was 3 meters. On the right side of the photomontage pictures was an apartment building and on the left side were various street-planting models. Long plot types and short plot types were selected to represent the two plot types in this survey, since they are those most often seen in Sapporo. *Robinia pseudoacacia* was the tree species chosen to appear on the photo montages in which trees were present because it is one of the most frequently planted species in the streets of Sapporo, and particularly in the central area (Table 1). The flower species included in the experiments were also very common in Sapporo – *Petunia sp.*, *Tagetes sp.*, *Althea sp.*, *Impatiens sp.*, *Begonia sp.*, *Salvia sp.* Consequently the processed photomontages did not appear altogether unfamiliar to respondents.

Three experiments were designed. The two common factors to be investigated in all three experiments were (1) trees – absent or present and (2) plot type length – short or long. The third factor, the contents of the flower bed and its characteristics, differed among the experiments.

In Experiment A (17 photomontages), preferences for different flower bed elements, such as ‘soil’, ‘grass’, ‘hedge’ or ‘flowers’ were investigated. The design scheme is shown in Figure 2 and all the pictures in Appendix A. These elements were selected because they are those most frequently seen in Sapporo streets. However, due to the heavy snowfalls in the area, hedge formations are not seen as often in Sapporo, as in other, southern Japanese cities. Each element was repeated in four photomontages – in long and short plot type, with and without trees. Experiment A also included a base picture without any street-planting at all.

Experiment B (36 photomontages) addressed preferences for different colours and height of the flower bed element ‘flowers’. Figure 3 shows the design scheme which is the same as the one in Experiment A and the photomontage simulations are shown in Appendix A. Overall there were nine flower bed elements all

		TA		T	
		I	II	I	II
N	Flower bed elements				
Photo No, experiment A series					
1	base photo	1*			
2	soil	2	6	10	14
3	grass	3	7	11	15
4	shrubs/hedge	4	8	12	16
5	flowers	5	9	13	17

TA: trees absent; T: trees present; I: short plot type; II: long plot type

\*: photo No 1 has neither plot type, nor trees, nor flower bed

**Figure 2** Design model of experiment A.

		TA		T				
		I	II	I	II			
N	Flower bed elements							
		colour	species	height	arrangement	Photo No, experiment B series		
1	red	single	low	ordered	1	10	19	28
2	yellow	single	low	ordered	2	11	20	29
3	white	single	low	ordered	3	12	21	30
4	mixed	single	low	ordered	4	13	22	31
5	purple	single	low	ordered	5	14	23	32
6	mixed	mixed	differ	chaotic	6	15	24	33
7	red	single	tall	moder. ord.	7	16	25	34
8	white	single	tall	moder. ord.	8	17	26	35
9	mixed	single	tall	moder. ord.	9	18	27	36

TA: trees absent; T: trees present; I: short plot type; II: long plot type

moder. ord.: moderately ordered

**Figure 3** Design model of experiment B.

consisting of flowers of different colour and height, each being repeated in four photomontages in a similar way to Experiment A.

In Experiment C (8 photomontages, two of which were the same as in Experiment B), photomontages were designed according to an orthogonal array model (Table 2; Appendix A). The emphasis was on some of the flower bed characteristics, taken as factors on two levels. For factors were selected the following features: plot type – short or long; trees – absent or present; arrangement – chaotic or ordered; height – low or tall; colours – delicate or bright and composition – mixed or single.

**Table 2** Design model of Experiment C

Factors:	Plot type	Trees	Arrangement	Height	Colours	Composition
Levels:	short	absent	chaotic	low	delicate	mixed
	long	present	ordered	tall	bright	single

Combinations of factors' levels						
Photo No	Plot type	Trees	Arrangement	Height	Colours	Composition
1	short	absent	chaotic	low	delicate	mixed
2	short	absent	chaotic	tall	bright	single
3	short	present	ordered	low	delicate	single
4	short	present	ordered	tall	bright	mixed
5	long	absent	ordered	low	bright	mixed
6	long	absent	ordered	tall	delicate	single
7	long	present	chaotic	low	bright	single
8	long	present	chaotic	tall	delicate	mixed

## 2). Questionnaire survey

The survey was conducted at the end of October 2000, using a sample of students, majoring in landscape architecture and horticultural science ( $n=25$ ) and residents from various districts of Sapporo ( $n=56$ ).

Firstly, respondents were asked to evaluate the full collection of 59 photomontages on a five-step rating scale, from “strongly like” (5) to “strongly dislike” (1). Respondents received the photomontages in a random order and ranked them by putting each image on a board with five marked areas representing the scale. In order to grasp respondents first impression of the photomontages they were told not to spend too long considering them. Ratings were written down in tables by the researchers while the respondents were filling in an additional questionnaire.

The second part of the survey consisted of completing a questionnaire related to attitudes to street flowers. The questionnaire consisted of structured items, mainly multiple-choice combined with an open-ended item. There were fourteen structured items (for details see Table 14) in the form of a rank list, all of which were related to perceptions of, and attitudes to, street flowers. Respondents were asked to rank each item on a five-step rating scale from “strongly agree” (5) to “strongly disagree” (1). An open-ended item “other” left for participants comments and opinions was also provided as well as structured items concerning demographic characteristics.

## 3). Demographic characteristics

The majority of respondents were in their 20s (49%). Fifty-two percent of respondents were men and forty-eight percent were women. A rented apartment was the dominant dwelling type of most of respondents, followed by self-owned detached housing. Students were the largest single group in the distribution of

**Table 3** Demographic characteristics of the respondents in Sapporo

item	category	n	%
Age	10s	1	1.2
	20s	40	49.4
	30s	10	12.3
	40s	9	11.1
	50s	14	17.3
	60s and over	7	8.6
Gender	male	42	51.9
	female	39	48.1
Dwelling type	self-owned detached house	25	30.9
	self-owned apartment	6	7.4
	rented apartment	40	49.4
	rented house	5	6.2
	company house	0	0.0
	company residence	1	1.2
	lodging, dormitory	2	2.5
	public housing	2	2.5
Occupation	government/public employee	11	13.6
	office employee	12	14.8
	corporate management	8	9.9
	self-employed trade/services	5	6.2
	consultant/professional	2	2.5
	part-time worker	4	4.9
	student	25	30.9
	housewife	6	7.4
	pensioner	1	1.2
	other	7	8.6
	Area	kita	32
higashi		10	12.3
chuo		11	13.6
teine		6	7.4
nishi		5	6.2
shiroishi		5	6.2
minami		4	4.9
other		8	9.9

**Table 4** Exp. A - Evaluation of photomontage simulations - mean and standard deviation

photo No	Mean	SD	Photos' characteristics:		
			plot	trees	elements
1	1.51	0.91	no	no	no
2	1.27	0.71	short	no	soil
3	1.75	0.87	short	no	grass
4	3.01	1.10	short	no	shrubs
5	3.53	1.05	short	no	flowers
6	1.31	0.65	long	no	soil
7	2.09	1.14	long	no	grass
8	3.23	1.18	long	no	hedge
9	3.79	0.94	long	no	flowers
10	2.72	0.98	short	yes	soil
11	3.11	1.18	short	yes	grass
12	3.38	1.23	short	yes	shrubs
13	4.20	0.89	short	yes	flowers
14	2.58	1.05	long	yes	soil
15	3.60	1.13	long	yes	grass
16	3.64	1.34	long	yes	hedge
17	4.35	0.91	long	yes	flowers

respondents according to occupation (Table 3).

## C. Results

### 1). Ratings of photomontage simulations of street-planting models

#### a). Experiment A

Averaged ratings for each photomontage simulation revealed that the three most liked photomontages in Experiment A were those with flowers, and in particular bright flowers with mixed colours of yellow, orange and some red (photo No 17, 13, 9). The two most liked photomontages in Experiment A and overall throughout the three experiments (Table 4) depicted bright flowers (yel-

low *Tagetes sp.*, pink *Petunia sp.*) in long or short plot type with trees (photo No 17, 13). It should also be noted that a photomontage representing flowers in long plot type without trees (photo No 9, Table 4) was rated higher (mean 3.79) than compositions of grass (photo No 11, and No 15) or hedge (photo No 12, and No16) with trees.

Pictures of short and long plot types without trees, having 'soil' as a flower bed element, had the lowest ratings (photo No 2 and No 6). Even the picture with no flower beds nor trees at all (photo No 1) was considered slightly preferable (Table 4). Though not occurring very often, plots like those in picture No 2 and 6 exist, especially in cases where the tree has died, or has been cut or damaged. Left untended, without plants, such flower beds look bare and untidy. Planting only flowers at these empty plots would not take much effort, but may change the aesthetic quality of a street to a great extent.

### **b). Experiment B**

In experiment B the picture of yellow flowers (*Tagetes sp.*), long plot type and trees (photo No 29, Table 5) was the most preferred. Following were three pictures with equal scores, all of them with trees - red flowers, short plot type (photo No 19) purple flowers, short plot (photo No 23) and purple flowers, long plot type (photo No 32). A composition of white flowers, long plot type and trees was in fifth place (photo No 30) (Table 5). It may be noted that all of these compositions involve low, ordered, single species arrangements. Photo No 6, consisting of mixed species of flowers in short plot type without trees and with chaotic appearance, received the lowest mean scores for this experiment. Pictures of white tall flowers (*Althea sp.*) in short plot type (photo No 8) and tall flower compositions of mixed colours (white and red, photo No 18) both without trees, were also rated low.

### **c). Experiment C**

In Experiment C the highest ratings were for photo No 3 - low composition of single species with white colours in short plot type with trees (Table 6). However a picture intended to represent a chaotic composition (photo No 7) was rated in second place. The photo depicted low red *Salvia* species without order in their arrangement and some spots of grass and soil, in long plot type with trees. The high ratings for this picture could be explained by the presence of trees and compatibility between the red and green colours. The picture characterised by long plot type without trees, having an ordered, mixed composition of two species and two colours (orange and red, photoNo 5) was rated relatively high.

## **2). Analysis of factors influencing preference and comparison of mean scores**

### **a). Experiment A**

A General Linear Model analysis was conducted to analyse preferences for street-planting models. It revealed that 'trees' had the greatest effect on preferences (Table 7). As for plot type preference, 'long plot type' was preferred to 'not

**Table 5** Exp. B - Evaluation of photomontage simulations - mean and standard deviation

photo No	Mean	SD	Photos' characteristics:						
			colour	plot	trees	species	height	arrangement	
1	3.05	1.08	red	short	no	single	low	ordered	
2	2.86	0.98	yellow	short	no	single	low	ordered	
3	2.88	1.10	white	short	no	single	low	ordered	
4	3.19	1.07	mixed	short	no	single	low	ordered	
5	3.16	1.01	purple	short	no	single	low	ordered	
6	2.22	0.95	mixed	short	no	mixed	differ	chaotic	
7	2.73	1.10	red	short	no	single	tall	moder. ord.	
8	2.41	0.91	white	short	no	single	tall	moder. ord.	
9	2.57	1.04	mixed	short	no	single	tall	moder. ord.	
10	2.77	1.11	red	long	no	single	low	ordered	
11	3.11	1.01	yellow	long	no	single	low	ordered	
12	3.20	1.08	white	long	no	single	low	ordered	
13	3.20	1.04	mixed	long	no	single	low	ordered	
14	3.23	1.02	purple	long	no	single	low	ordered	
15	2.64	1.09	mixed	long	no	mixed	differ	chaotic	
16	2.79	0.93	red	long	no	single	tall	moder. ord.	
17	2.53	1.03	white	long	no	single	tall	moder. ord.	
18	2.47	1.11	mixed	long	no	single	tall	moder. ord.	
19	4.02	0.81	red	short	yes	single	low	ordered	
20	3.94	0.90	yellow	short	yes	single	low	ordered	
21	3.90	0.93	white	short	yes	single	low	ordered	
22	3.91	0.90	mixed	short	yes	single	low	ordered	
23	4.02	0.99	purple	short	yes	single	low	ordered	
24	3.14	1.20	mixed	short	yes	mixed	differ	chaotic	
25	3.17	1.18	red	short	yes	single	tall	moder. ord.	
26	2.72	1.09	white	short	yes	single	tall	moder. ord.	
27	2.88	1.11	mixed	short	yes	single	tall	moder. ord.	
28	3.84	1.01	red	long	yes	single	low	ordered	
29	4.05	0.96	yellow	long	yes	single	low	ordered	
30	3.98	0.82	white	long	yes	single	low	ordered	
31	3.94	0.91	mixed	long	yes	single	low	ordered	
32	4.02	0.92	purple	long	yes	single	low	ordered	
33	3.67	1.08	mixed	long	yes	mixed	differ	chaotic	
34	3.27	1.22	red	long	yes	single	tall	moder. ord.	
35	2.79	1.16	white	long	yes	single	tall	moder. ord.	
36	2.65	1.23	mixed	long	yes	single	tall	moder. ord.	

moder.ord.: moderately ordered

**Table 6** Exp. C - Evaluation of photomontage simulations - mean and standard deviation

photo No	Mean	SD	Photos' characteristics:					
			plot	trees	arrangement	height	colour	composition
1	2.06	0.97	short	no	chaotic	low	delicate	mixed
2	2.20	0.91	short	no	chaotic	tall	bright	single
3	3.90	0.93	short	yes	ordered	low	delicate	single
4	3.31	1.17	short	yes	ordered	tall	bright	mixed
5	3.22	0.97	long	no	ordered	low	bright	mixed
6	2.53	1.03	long	no	ordered	tall	delicate	single
7	3.38	0.98	long	yes	chaotic	low	bright	single
8	2.67	1.04	long	yes	chaotic	tall	delicate	mixed

**Table 7** Exp. A - Analysis of variance, influence of plot, trees, flower bed and the interactions between them on preferences

factor	F value
model	74.59 ***
plot	83.44 ***
trees	274.75 ***
flower bed	226.17 ***
plot x trees	0.04
plot x fl. bed	2.78 *
trees x fl. bed	21.21 ***
plot x trees x fl. bed	0.43

\*\*\*:  $p < 0.001$ , \*:  $p < 0.05$

**Table 8** Exp. A - Comparisons of mean scores of the choices for plot, trees, flower bed

factor	levels	mean
plot	not present	1.51 a
	short	2.87 b
	long	3.07 c
trees	not present	2.39 a
	present	3.45 b
flower bed	not present	1.51 a
	soil	1.97 b
	grass	2.64 c
	shrubs	3.32 d
	flowers	3.97 e

Means with the same letters are not significantly different, according to Sheffé's multiple comparison procedure ( $p < 0.05$ ).

present' or 'short'. Among the flower bed elements the most preferred group was 'flowers', consisting of a mixed composition of flowers with bright colours, yellow and orange *Tagetes sp.* and some red *Petunia sp.* (Table 8). Bright flowers were the most preferred element for a street flower bed, from a choice that also included soil, grass and hedge. There were significant differences between the levels of each of three factors.

### b). Experiment B

Again the factor 'trees' had the greatest effect (Table 9). 'Long plot type' was the preferred type ( $p < 0.05$ ). As for flower preferences, the group of purple flowers (*Petunia sp.*) had the highest ratings (Table 10). There was no significant difference between the five groups involving low and ordered compositions of

**Table 9** Exp. B - Analysis of variance, influence of plot, trees, flower bed and the interactions between them on preferences

factor	F value
model	23.78 ***
plot	4.02 *
trees	350.46 ***
flower bed	48.98 ***
plot x trees	0.29 *
plot x fl. bed	3.24 **
trees x fl. bed	7.20 ***
plot x trees x fl. bed	0.26

\*\*\*:  $p < 0.001$ , \*\*:  $p < 0.01$ , \*:  $p < 0.05$

**Table 10** Exp. B - Comparisons of mean scores of the choices for plot, trees, flower bed

factor	levels	mean			
plot	short	3.15 a			
	long	3.23 b			
trees	not present	2.83 a			
	present	3.55 b			
flower bed	colour	species	height	arrangement	
	white	single	tall	moder. ord.	2.61 a
	mixed	single	tall	moder. ord.	2.64 a
	mixed	mixed	differ	chaotic	2.92 ab
	red	single	tall	moder. ord.	2.99 b
	red	single	low	ordered	3.42 c
	white	single	low	ordered	3.49 c
	yellow	single	low	ordered	3.49 c
	mixed	single	low	ordered	3.56 c
	purple	single	low	ordered	3.61 c

Means with the same letters are not significantly different, according to Sheffé's multiple comparison procedure ( $p < 0.05$ ).

flowers with different colours (Table 10) – red (*Petunia* or *Begonia* sp.), yellow (*Tagetes* sp.), white (*Impatiens* sp.), mixed (*Petunia* sp.) and purple (*Petunia* sp.). However, all of the groups with tall flowers were evaluated low. The lowest ratings were for the group of flowers depicting tall compositions of *Althea rosea* with white colours. During the survey there were comments from many respondents that they found this species neither attractive nor appropriate to the streetscape. In this experiment a photomontage representing compositions of yellow *Tagetes* sp. in long plot type with trees received the highest ratings (mean 4.05; photo No 29).

### c). Experiment C

The ‘trees’ factor again had the strongest influence on preferences, followed by the factors ‘arrangement’ (with preference for ‘ordered’), ‘height’ (for which ‘low’ flowers were preferred to ‘tall’), and ‘colours’ (with preference for ‘bright’ over ‘delicate’) (Table 11). As for ‘composition’ of species, ‘single’ obtained higher mean scores than ‘mixed’. There was no significant difference between preferences for ‘plot type’ in this experiment. The highest ratings were for the photomontage (same was included in Exp. B) representing white flowers (*Impatiens* sp.) in short plot type with trees (mean 3.90, photo No 3). According to Experiment C, bright colours were preferred to delicate, and overall throughout the three experiments in the case of Sapporo, images with bright flowers were rated highest. Considering the predominance of the colour grey in streetscapes, a preference for bright flowers is quite understandable. The compatibility of purple and green and the grey colours of the surroundings could also have contributed to the especially high ratings of the purple flowers in Experiment B.

### 3). Differences in preferences based on personal characteristics

A T-test was performed to check for any differences in preferences based on personal characteristics such as occupation (landscape architecture students and others), gender or age.

#### a). Occupation

There were significant differences in preferences between students and other respondents for only one photomontage in Experiment A, four in Experiment B and one in Experiment

**Table 11** Exp. C – Analysis of variance, influence of plot, trees, arrangement, height, colour and composition on preferences and comparisons of mean scores

factor	levels	mean	F value
model			33.30 ***
plot	short long	2.87 a 2.95 a	1.12
trees	not present present	2.50 a 3.31 b	106.19 ***
arrangement	chaotic ordered	2.58 a 3.24 b	70.97 ***
height	low tall	3.14 b 2.68 a	35.00 ***
colour	delicate bright	2.79 a 3.03 b	9.10 **
composition	mixed single	2.81 a 3.00 b	5.71 *

\*\*\*:p<0.001, \*\*:p<0.01, \*:p<0.05

Means with the same letters are not significantly different, according to Sheffé's multiple comparison procedure (p<0.05).

C (Table 12). Students tended to give higher ratings than other respondents. Though it is difficult to find common features between all these photomontages, it could be summarised that two of them had one of the highest ratings overall (photo No 17; App. A-3 and photo No 23; App. A-7) whereas all the rest, depicting *Althea* sp. (photo No 25, No 26; App. A-8 and photo No 8; App. A-11) were rated low overall.

#### b). Gender

There was a significant difference in preferences between men and women for four pictures in Experiment A and two in Experiment B (Table 12). Lack of trees, short or long plot types with 'soil' or 'grass' as a flower bed element were features common to the four photomontages in Experiment A (photo No 2, 3, 6 and No 7; App. A-1~A-2). The two photomontages in Experiment B were of chaotic appearance barely depicting flowers in a short plot type with and without trees (photo No 6; App. A-4 and No 24; App. A-7). Men tended to rate these photomontages higher than women did. However, overall these images were rated low.

#### c). Age

There was a difference in preferences between people of age 50–69 and over (Table 13) and those of age 30–49 who gave higher ratings to only one photomontage in Experiment A, depicting grass in a short plot type without trees (photo No 3; App. A-1). Also there was a difference in preferences between people of age 50–69 and over and those of age 10–29 who gave higher ratings to one photomontage in Experiment C, depicting a chaotic combination of tall flowers (photo No 8; App. A-11).

**Table 12** Differences in preferences between students and other respondents and between men and women

photo No	students	others	t value	men	women	t value
	mean n=25	mean n=56		mean n=42	mean n=39	
<b>Experiment A</b>						
17	4.60	4.23	1.99	*		
2	-	-	-	1.45	1.08	2.54 *
3	-	-	-	1.98	1.51	2.50 *
6	-	-	-	1.52	1.08	3.40 **
7	-	-	-	2.43	1.72	2.99 **
<b>Experiment B</b>						
23	4.32	3.89	2.15	*	-	-
25	3.56	3.00	2.31	*	-	-
26	3.12	2.54	2.29	*	-	-
33	4.24	3.41	3.38	**	-	-
6	-	-	-	2.48	1.95	2.59 *
24	-	-	-	3.40	2.85	2.14 *
<b>Experiment C</b>						
8	3.20	2.43	3.28	**		

\*\* :  $p < 0.01$ , \* :  $p < 0.05$

**Table 13** Differences in preferences between age groups

photo No	age group	N	mean	F value
<b>Experiment A</b>				
3				3.70 *
	10-29	41	1.78 ab	
	30-49	19	2.11 b	
	50-69 and over	21	1.38 a	
<b>Experiment C</b>				
8				4.69 *
	10-29	41	3.00 b	
	30-49	19	2.32 ab	
	50-69 and over	21	2.33 a	

\* :  $p < 0.05$

Means with the same letters are not significantly different, according to Sheffé's multiple comparison procedure ( $p < 0.05$ ).

#### 4). Attitudes to street flowers

##### a). Mean scores

Of the fourteen variables related to street flowers, the following five had mean scores showing strong agreement (higher than four, on a five-step rating scale): street flowers *'make the street look beautiful'* (mean 4.81) *'make the street more restful'* (mean 4.70) *'help to make us aware of seasonal changes'* (mean 4.43) *'provide pleasant scents and colours'* (mean 4.37) and *'separate pedestrians from traffic, giving a feeling of safety'* (mean 4.11). All the rest were rated between three and four (Table 14).

##### b). Factor analysis

A factor analysis of the fourteen variables related to street flowers revealed five factors which were retained by the criterion of selecting eigen values greater than one. Varimax rotation of the first five principal components yielded five factors that explained 64.8% of the variance (Table 14).

The first factor, explaining 17.4% of the variance, could be interpreted as 'psychological benefits and aesthetic value' and summarises the following statements related to street flowers: *'make the street look beautiful'*, *'make the street look more restful'*, *'give each street individuality, could act as a symbol for the street'*, *'separate pedestrians from traffic, giving a feeling of safety'* and *'provide pleasant scents and colours'*.

The second factor, explaining 13.5% of the variance, could be formulated as 'natural-environmental'. This factor embodies the following three statements: *'give the street a natural appearance'*, *'help to make us aware of seasonal changes'*

**Table 14** Factor analysis of the variables related to street flowers

items related to street flowers	factor loadings					communality	mean score
	I	II	III	IV	V		
<b>I : psychological benefits and aesthetic value</b>							
make the street look beautiful	0.89	0.00	-0.10	-0.09	-0.10	0.82	4.81
make the street more restful	0.76	0.19	0.10	-0.10	-0.21	0.67	4.70
give each street individuality, could act as symbol for street	0.63	0.04	-0.07	0.31	0.49	0.74	3.91
separate pedestrians from traffic, giving a feeling of safety	0.56	0.48	0.01	0.07	0.07	0.55	4.11
provide pleasant scents and colours	0.43	0.21	0.31	0.42	-0.31	0.60	4.37
<b>II : natural-environmental</b>							
give the street a natural appearance	0.05	0.79	-0.07	0.08	-0.12	0.66	3.72
help to make us aware of seasonal changes	0.10	0.74	0.14	0.00	-0.03	0.58	4.43
provide opportunities for communication among local maintainers	0.14	0.61	0.17	-0.15	0.42	0.62	3.56
<b>III : practical concerns</b>							
help prevent bicycles being left	0.03	0.10	0.81	-0.16	0.06	0.69	3.25
are convenient in winter, needing no special care	0.11	0.04	0.74	0.16	0.05	0.59	3.42
obstruct pedestrians when big and tall	-0.29	0.01	0.56	0.03	0.29	0.48	3.11
<b>IV : effort to maintain</b>							
are difficult to maintain	-0.01	-0.05	0.01	0.91	-0.03	0.83	3.85
are expensive to maintain	-0.12	0.09	-0.01	0.62	0.50	0.65	3.48
<b>V : non-aesthetic</b>							
are not very pleasant when withered	-0.16	-0.05	0.29	0.03	0.68	0.58	3.48
Contribution of each factor (%):	17.4	13.5	12.7	11.3	9.9	64.8	

□ : factor loadings > 0.40

and *'provide opportunities for communication among local maintainers'*.

The third factor, which explains 12.7%, could be interpreted as 'practical concerns', and summarises the variables *'street flowers help prevent bicycles being left'*, *'street flowers are convenient in winter, needing no special care'* and *'street flowers obstruct pedestrians when big and tall'*.

The fourth factor, 'effort to maintain', explains 11.3% of the variance and concerns the statements *'street flowers are difficult to maintain'* and *'street flowers are expensive to maintain'*.

The fifth factor, explaining 9.9% of the variance, is related to the statement *'street flowers are not very pleasant when withered'* and could be interpreted as a 'non-aesthetic' factor.

### c). Differences in attitudes based on personal characteristics

a) Occupation: A significant difference between students and other respondents was only found towards one of the items related to street flowers. Students ranked the statement: 'street flowers give the street a natural appearance' lower than other respondents (Table 15).

b) Gender: Women tended to agree more than men with the following variables: *'street flowers make the street look beautiful'*, *'street flowers give each street individuality, and could act as a symbol for the street'* and *'street flowers separate*

**Table 15** Differences in attitudes towards street flowers between students and other respondents

Variable	students mean n=25	others mean n=56	t value
give a street a natural appearance	3.04	4.02	-3.54 **

\*\* : p<0.01

**Table 16** Differences in attitudes towards street flowers between men and women

Variable	men mean n=42	women mean n=39	t value
make street look beautiful	4.67	4.97	-2.97 *
give each street individuality, could act as symbol for street	3.67	4.18	-2.43 *
separate pedestrians from traffic, giving a feeling of safety	3.86	4.38	-2.39 *

\*: p<0.05

**Table 17** Differences in attitudes towards street flowers between age groups

Variable	age	N	mean	F value
help prevent bicycles being left	10-29	41	3.39 b	5.33 **
	30-49	19	2.42 a	
	50 and over	21	3.71 b	

\*\* : p<0.01

Means with the same letters are not significantly different, according to Sheffé's multiple comparison procedure (p<0.05).

*pedestrians from traffic, giving a feeling of safety*' (Table 16).

c) Age: Opinions differed between people of age 30–49 and the other two age groups (age 10–29 and 50–69 and over), who agreed more with the statement that *'street flowers help prevent bicycles being left'* (Table 17).

#### **D. Discussion**

Confirming previous research findings (Schroeder and Cannon, 1983; Sommer et al. 1990, 1992; Wolf, 2003) the results of this study as well show the importance of trees to the aesthetic quality of streetscapes. Furthermore, they reveal the importance of the appearance of the space beneath trees. While the presence of trees appeared to be the single most important factor, among possible elements for the space beneath the trees, flowers were the most preferred, and in particular low and ordered flower compositions. The results also confirmed previous findings of Fujiwara and Tashiro (1984) Matsuda et al. (1989) Abe et al. (1990) and Shimomura (1994) that combined types of street plantings were more preferred than only single trees. However, according to this survey, flowers were the most preferred element to combine with street trees. Bright flowers were the most favoured element for a street flower bed, from a choice that included soil, grass and hedge. On the whole, there was no significant difference among preferences for arrangements involving low, ordered flowers of different colours (purple, red, white, yellow and mixed). However, according to Experiment C, bright colours were preferred to delicate, and overall throughout the three experiments, images with bright flowers were rated highest. Considering the predominance of the colour grey in streetscapes, a preference for bright flowers is quite understandable. The compatibility of purple and green and the grey colours of the surroundings could also have contributed to the especially high ratings of the purple flowers in Experiment B.

Combined as a whole, the results revealed that various colours of flowers were liked. However the arrangement and height of the flowers were more important than colours. Most preferred were ordered arrangements of low, single species of flowers, suggesting compact and tidy compositions. Research related to aesthetic response to natural landscapes and forests has also shown that preferred landscapes are comparatively ordered, and aesthetic preference is higher for managed forest stands than for non-manipulated (Ulrich, 1986). Chaotic compositions and tall flowers, represented in this survey mainly by the *Althea rosea* species were not favoured by respondents and received a low evaluation. However, *Althea rosea* is one of the species frequently seen during the summer on the streets of Sapporo, probably due to self reproduction. Some of the respondents held the opinion that tall flowers reduce drivers visibility, thus exposing children on the sidewalk to danger, which could have influenced the low ratings for photomontages representing tall flowers. Regarding the height of street vegetation, previous research findings (Ichihashi et al., 2000) have demon-

strated differences in preference between drivers and pedestrians, in particular trees or shrubs at knee height improve the sidewalk for pedestrians but reduce the information available to drivers. Therefore, when discussing the height of street flowers, drivers' preferences should also be considered, however this is a subject of further inquiry. On the other hand, the low ratings for tall flowers in this study could also have resulted from attitudes towards the *Althea rosea* species, which was disliked by many respondents as they shared during the survey. Nevertheless, whilst the *Althea rosea* species was mainly used to represent tall flowers in this experiment, it could still be supposed that tall flowers in general would not be favoured as street flowers. Therefore, further research regarding the height of street flowers, even involving different species and geographical regions, might lead to the same findings since many species of tall flowers appear unordered as they are unable to grow straight and compact without support, particularly in narrow spaces. In addition, tall flowers also reduce visibility, but for pedestrian convenience a sidewalk should be safe, tidy and easy to walk, without elements that reduce visibility. As it was discussed above, orderliness is an important factor influencing preferences for natural landscapes (e.g. Ulrich, 1986).

The shape of the plot appeared to influence the preferences made in relation to its contents. In Experiment A, in which the flower beds contained a variety of elements (soil, grass, hedge or flowers), the long plot type was preferred. In cases where flower beds consisted of various arrangements, colours and heights of flowers (Experiment B), the preference was also for the long plot type. However, results from Experiment C did not show a difference in preference for the two plot types. Evidently, when planning the shape of a plot, its contents should be taken into account.

There were some differences in preferences for street-planting models with flowers, based on occupation, gender, and age. Students tended to give higher rankings to photomontages that were rated higher overall but also to photomontages that were rated lower overall - such as those depicting *Althea rosea*. In studies concerning preference, it is not uncommon to find that what is favoured by landscape professionals does not appeal as much to the public, and vice versa (e.g. Buhyoff et al., 1978; Hitchmough and Bonugli, 1997). Also, men gave higher ratings than women to photomontages depicting neither trees nor flowers and were rated low overall. This is consistent with the fact that men and women also had different attitudes towards street flowers, or men tended to agree less than women did with some of the statements relating to the psychological and aesthetic benefits of street flowers. However, some gender differences in colour preferences (e.g. Ellis and Ficek, 2001) could also have contributed to these results.

Among the statements related to attitudes towards street flowers, the highest rated were those connected with the aesthetic and psychological benefits people

derive from flowers on the street. It seems flowers were appreciated not only for their contribution to the aesthetic quality of a street but also for their positive influence on psychological well-being.

Five factors emerged from an analysis of the fourteen variables related to street flowers - (1) "psychological benefits and aesthetic value", (2) "natural-environmental", (3) "practical concerns", (4) "effort to maintain" and (5) "non-aesthetic". The first factor combined variables related to beauty and safety which have been seen to be related in other studies as well (e.g. Peterson, 1967; Jorgensen et al., 2002) indicating that perceived safety is related to the conditions that are preferred. The second factor, formulated as 'natural-environmental', contained statements concerning human communication as well as natural changes. Communication is the transmission of information, so all changes in nature that affect us in one way or another could be regarded as a form of communication.

Street flowers were highly appreciated for their contribution to the aesthetic quality of a street, but people also seemed to be concerned about their maintenance. However, if residents favour street flowers, many of them may be willing to be involved with their planting and maintenance.

It should be noted that Japanese people are very appreciative of nature and in the recent years there has been an increased interest in flower-planting by citizens all over Japan. In Hokkaido as well many cities have been decorated with flowers by the combined efforts of citizens and administration. These facts could have also influenced respondents preferences for flowers over other vegetation types planted in a street flower bed with or without trees.

Since personal attributes such as familiarity with an area (Wellman and Buyhoff, 1980) residential background of urbanisation (Schroeder, 1983) religion (Tips and Savasdisara, 1986c) and ethnicity (Kaplan and Talbot, 1988) have been reported to affect preferences, it may be assumed that differences in preference regarding street flowers may occur even among Japanese subjects from different regions of Japan. Such an assumption could also be supported by the fact that Japan stretches out over a wide latitudinal range characterised by different microclimatic conditions and flora.

According to the results of this survey, even though trees prove to be one of the most important factors influencing preference for street-planting models, landscape architects should not just limit street plantings to trees, but look for opportunities to benefit from using various small plants and particularly flowers. The use of street flowers can be suggested not only as a means of making streets more relaxing, pleasant, and safe from traffic but also as a means of enhancing communication among residents through the process of planting and maintenance. Such consideration corresponds to the findings of Kuo (2003) that neighbourhood greenery contributes to healthier interactions among residents and a greater sharing of resources.

#### IV. Cross-cultural comparison of preferences for street-planting models between Japanese and Bulgarian respondents

##### A. Introduction and purpose of the study

In Chapter I was already noted that many studies have demonstrated cultural differences in preferences for natural or urban landscapes (Buhyoff and Wellman, 1983; Talbot and Kaplan, 1984; Tips and Savasdisara, 1986abc; Kaplan and Herbert, 1987; Yang and Kaplan, 1990; Yu, 1995). Cultural differences in landscape appreciation have been found between Asian residents and Western tourists (Tips and Savasdisara, 1986a), Korean residents and Western visitors (Yang and Kaplan, 1990) and Chinese residents and American students (Yu, 1995). Consequently, the photomontages described in Chapter III, might be evaluated differently by subjects from other cultures, who might consider other types of vegetation more appealing than flowers. Therefore, in order to investigate cultural differences in preferences for street-planting models, the survey discussed in Chapter III was also carried out in Sofia, Bulgaria. Chapter IV concerns cross-cultural comparison of preferences for street-planting models between Japanese and Bulgarian respondents.

Sofia and Sapporo are situated in the same latitude, both cities have similar climate with differentiated four seasons and many similar or even same plant species (Figure 4). Sidewalks in Sofia are almost as wide as in Sapporo and the presence of separating green strip between the sidewalk and the roadway is common and often planted with trees in combination with shrubs or only grass. Street flowers are not uncommon for the streetscapes in Sofia, but they are mainly used in the middle strips of boulevards, where roses are usually planted. However even though there is enough space available to plant flowers on the streets, flowers are rarely planted, which might be due to various reasons such as

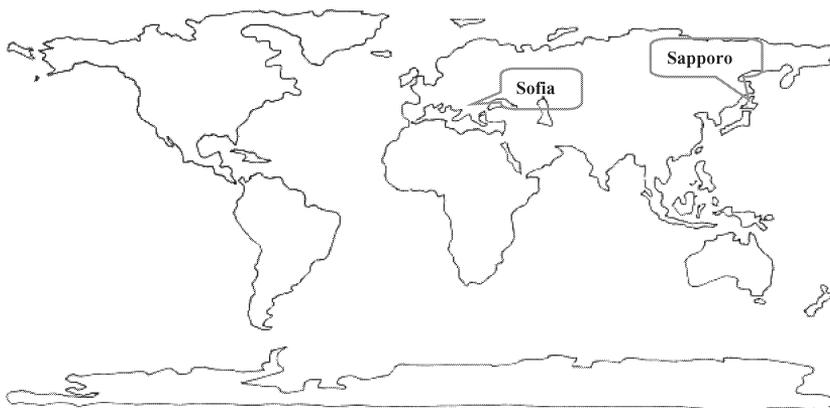


Figure 4 World map - location of Bulgaria and Hokkaido.

the worsened economy, low municipality budget or damaged soil caused by car parking on the sidewalks. In Sofia, flowers or ground cover plants could be seen in areas of retail business or around some condominiums in residential areas where they are obviously planted by the residents living there. The green spaces in front condominiums are in most cases situated on the side of a building, but also can be found in the middle of the sidewalk or near the roadway. They are often planted with trees, shrubs, hedges and flowers. Nowadays around many condominiums in Sofia people have planted flowers, small shrubs or even trees by themselves, and the plantings are often protected by improvised fences. However, no organized street flower-planting activities carried out by citizens were found by this investigation to date.

## B. Methodology

### 1). Evaluation of photomontage simulations

The photomontages used for the survey in Sapporo were used for the survey undertaken in Sofia, Bulgaria, since overall the photomontages did not appear unfamiliar to Bulgarian respondents mainly due to the tree and flower species used. In Sofia, the survey was carried out at the end of April 2001. Thirty-one residents of Sofia, including 14 men and 17 women evaluated the same set of 59 photomontage simulations described in Chapter III.

### 2). Demographic characteristics

The majority of the respondents were in their 20s (32.3%) and 30s (29.0%). Forty-five percent were men and fifty-five women. Most of the respondents lived in self-owned apartment (71%) and 65% lived in the suburbs. Forty-five percent were office employee (Table 18).

**Table 18** Demographic characteristics of the respondents in Sofia

item	category	n	%
Age	10s	2	6.5
	20s	10	32.3
	30s	9	29.0
	40s	4	12.9
	50s	5	16.1
	60s and over	1	3.2
Gender	male	14	45.2
	female	17	54.8
Dwelling type	self-owned apartment	22	71.0
	rented apartment	7	22.6
	public housing	2	6.5
Occupation	government/public employee	4	12.9
	office employee	14	45.2
	corporate management	2	6.5
	self-employed trade/services	6	19.4
	consultant/professional	1	3.2
	student	2	6.5
Area	pensioner	2	6.5
	centre	9	29.0
	suburbs	20	64.5
	no answer	2	6.5

## C. Results

### 1). Gender, age and country of origin and their influence on preferences

General Linear Model analysis was performed for each of the photomontages, included in the three experiments to see which of the factors 'gender', 'age'

or 'country' and the interactions between them ('gender x age', 'gender x country', 'age x country' and 'gender x age x country') were most influential on preferences. The results revealed that factor 'country' and the interaction, or the crossed-effect, 'age x country' were most influential on preferences (Table 19). Factor 'country' had strongest influence on preference in relation to photomontages depicting shrubs, hedge and tall flowers, whereas the combination 'age x country' was significant on preferences for photomontages depicting flowers, in particular compositions of low flowers without trees, 11 of which were included in Experiment B and one in Experiment A. The pictures in Experiment A, for which

**Table 19** Exp. A - Analysis of variance - the influence of gender, age and country and the interactions between them on preferences

photo No	model	gender	age	country	gender x age	gender x country	age x country	gender x age x country
Experiment A								
1						*		
2	*					**		
3	*	*				*		
4								
5			*	*			*	
6	*	**				**		
7		*						
8	*			***	*			
12				**				
13		*			*			
16				***				
17			*					
Experiment B								
4							*	
5							*	
6						*	*	
7								**
9	*			**				
11				*			*	
12							**	
13			*				*	
14							**	
15				*			**	
20	*			*				
21							*	
23			*					
26				*			*	
27				*				
29	**		*	**				
30				*				
32							*	
35				**				
36				**				
Experiment C								
2				**				
4				**				
8		*						

\*\*\*:p<0.001, \*\*:p<0.01, \*:p<0.05

factor 'country' had main effect on preferences were depicting shrubs or hedge. Most of the pictures in Experiment B for which factor 'country' was significant depicted compositions of tall *Althea* sp. and the rest depicted yellow or white flowers. One picture depicted chaotic compositions of flowers without trees. Factor 'country' was significant and for two of the pictures included in Experiment C, which also depicted tall flowers. The combination 'age x country' was significant for only one photomontage in Experiment A, depicting low flowers in a short plot type without trees, and 11 in Experiment B, most of which depicted different colours of flowers in short or long plot type without trees.

Table 20 shows the comparison of mean scores for the pictures where significant differences were found. It can be summarised that Bulgarian respondents evaluated higher than Japanese respondents photomontages depicting shrubs, hedge and tall flowers or were intended to represent chaotic compositions. On the other hand Bulgarians evaluated lower than Japanese photomontages depicting low and ordered flowers with yellow or white colours.

**Table 20** Comparisons of mean scores for the pictures where significant differences were found

photo No	gender		age			country	
	men n=56	women n=56	10-29 n=53	30-49 n=32	50 and over n=27	Japan n=81	Bulgaria n=31
<b>Experiment A</b>							
3	1.89	1.57					
5						3.53	3.03
6	1.45	1.16					
7	2.32	1.80					
8						3.23	4.13
12						3.38	4.03
13	4.32	3.95					
16						3.64	4.61
17			4.53	3.91	4.30		
<b>Experiment B</b>							
9						2.57	3.10
11						3.11	2.61
13			3.00	2.78	3.56		
15						2.64	3.13
20						3.94	3.45
23			4.17	3.59	3.96		
29			4.08	3.50	3.85	4.05	3.35
30						3.98	3.48
35						2.79	3.52
36						2.65	3.45
<b>Experiment C</b>							
2						2.20	2.74
4						3.31	3.97
8	2.91	2.50					

## 2). Ratings of photomontage simulations of street-planting models

### a). Experiment A

While the General Linear Model analysis showed which factors and the interactions between them were most influential on preferences, t-test was performed to see for which photomontages occur differences based only on country of origin.

In the case of Sofia, three of the highest rated pictures which received ratings higher than four on a five-step rating scale depicted hedge or shrubs (photo No 16, No 12 and No 8) and only one flowers (photo No 17). Bulgarian respondents rated all of the pictures depicting hedges or shrubs significantly higher than Japanese respondents (Table 21). The highest score received a photomontage depicting a hedge in a long plot type with trees (photo No 16, mean 4.61). In second place was rated the photomontage depicting flowers, which received the highest ratings in the case of Sapporo (photo No 17).

### b). Experiment B

Among the photomontages rated highly in experiment B (Table 22) two depicted red flowers (photo No 19 and No 28). Equally were evaluated pictures with mixed colours and with purple flowers (photo No 22 and No 23). The photomontage meant to represent a chaotic composition of flowers with trees in long plot type (photo No 33) was evaluated in the fourth place among the pictures in experiment B. Photomontages depicting tall flowers were rated significantly higher compared to the results from Sapporo (photo No 35 and No 36). However, compositions of yellow and white flowers were rated significantly lower (photo No 29 and No 30).

**Table 21** Exp. A - Evaluation of photomontage simulations - mean, standard deviation and comparison of means

photo No	*	<i>Sofia</i>		<i>Sapporo</i>		<b>Photos' characteristics:</b>		
		Mean	SD	Mean	SD	plot	trees	elements
1	*	1.23	0.50	1.51	0.91	no	no	no
2		1.48	0.77	1.27	0.71	short	no	soil
3		1.68	0.70	1.75	0.87	short	no	grass
4	*	3.48	1.12	3.01	1.10	short	no	shrubs
5	*	3.03	1.28	3.53	1.05	short	no	flowers
6		1.29	0.59	1.31	0.65	long	no	soil
7		2.00	1.00	2.09	1.14	long	no	grass
8	***	4.13	0.96	3.23	1.18	long	no	hedge
9		3.71	1.13	3.79	0.94	long	no	flowers
10		2.52	1.34	2.72	0.98	short	yes	soil
11		3.06	1.18	3.11	1.18	short	yes	grass
12	*	4.03	1.08	3.38	1.23	short	yes	shrubs
13		3.97	0.95	4.20	0.89	short	yes	flowers
14		2.35	1.20	2.58	1.05	long	yes	soil
15		3.29	1.19	3.60	1.13	long	yes	grass
16	***	4.61	0.62	3.64	1.34	long	yes	hedge
17		4.16	0.90	4.35	0.91	long	yes	flowers

\*\*\*:  $p < 0.001$ ; \*:  $p < 0.05$

**Table 22** Exp. B – Evaluation of photomontage simulations – mean, standard deviation and comparison of means

photo No	<i>Sofia</i>		<i>Sapporo</i>		Photos' characteristics:						
	Mean	SD	Mean	SD	colour	plot	trees	species	height	arrangement	
1	3.06	1.12	3.05	1.08	red	short	no	single	low	ordered	
2	2.65	0.95	2.86	0.98	yellow	short	no	single	low	ordered	
3	2.74	1.24	2.88	1.10	white	short	no	single	low	ordered	
4	3.13	1.18	3.19	1.07	mixed	short	no	single	low	ordered	
5	3.10	1.27	3.16	1.01	purple	short	no	single	low	ordered	
6	2.42	1.15	2.22	0.95	mixed	short	no	mixed	differ	chaotic	
7	2.97	1.17	2.73	1.10	red	short	no	single	tall	moder. ord.	
8	2.65	1.17	2.41	0.91	white	short	no	single	tall	moder. ord.	
9	*	3.10	1.27	2.57	1.04	mixed	short	no	single	tall	moder. ord.
10		2.77	1.18	2.77	1.11	red	long	no	single	low	ordered
11	*	2.61	1.12	3.11	1.01	yellow	long	no	single	low	ordered
12		2.87	1.15	3.20	1.08	white	long	no	single	low	ordered
13		2.74	1.32	3.20	1.04	mixed	long	no	single	low	ordered
14		2.90	1.22	3.23	1.02	purple	long	no	single	low	ordered
15		3.13	1.36	2.64	1.09	mixed	long	no	mixed	differ	chaotic
16		3.10	1.25	2.79	0.93	red	long	no	single	tall	moder. ord.
17		2.84	1.29	2.53	1.03	white	long	no	single	tall	moder. ord.
18		2.90	1.30	2.47	1.11	mixed	long	no	single	tall	moder. ord.
19		3.87	1.12	4.02	0.81	red	short	yes	single	low	ordered
20	*	3.45	1.12	3.94	0.90	yellow	short	yes	single	low	ordered
21		3.55	1.26	3.90	0.93	white	short	yes	single	low	ordered
22		3.77	1.12	3.91	0.90	mixed	short	yes	single	low	ordered
23		3.77	1.02	4.02	0.99	purple	short	yes	single	low	ordered
24		3.23	1.15	3.14	1.20	mixed	short	yes	mixed	differ	chaotic
25		3.32	1.25	3.17	1.18	red	short	yes	single	tall	moder. ord.
26		3.16	1.24	2.72	1.09	white	short	yes	single	tall	moder. ord.
27		3.35	1.43	2.88	1.11	mixed	short	yes	single	tall	moder. ord.
28		3.81	1.08	3.84	1.01	red	long	yes	single	low	ordered
29	**	3.35	1.14	4.05	0.96	yellow	long	yes	single	low	ordered
30	*	3.48	1.26	3.98	0.82	white	long	yes	single	low	ordered
31		3.68	1.17	3.94	0.91	mixed	long	yes	single	low	ordered
32		3.68	1.08	4.02	0.92	purple	long	yes	single	low	ordered
33		3.74	1.18	3.67	1.08	mixed	long	yes	mixed	differ	chaotic
34		3.42	1.36	3.27	1.22	red	long	yes	single	tall	moder. ord.
35	**	3.52	1.41	2.79	1.16	white	long	yes	single	tall	moder. ord.
36	**	3.45	1.31	2.65	1.23	mixed	long	yes	single	tall	moder. ord.

\*\* : p<0.01; \* : p<0.05

moder.ord.: moderately ordered

**Table 23** Exp. C – Evaluation of photomontage simulations – mean, standard deviation and comparison of means

Photo No	<i>Sofia</i>		<i>Sapporo</i>		Photos' characteristics:						
	Mean	SD	Mean	SD	plot	trees	arrang.	height	colour	comp.	
1	1.87	0.88	2.06	0.97	short	no	chaotic	low	delicate	mixed	
2	*	2.74	1.26	2.20	0.91	short	no	chaotic	tall	bright	single
3		3.55	1.26	3.90	0.93	short	yes	ordered	low	delicate	single
4	**	3.97	1.22	3.31	1.17	short	yes	ordered	tall	bright	mixed
5		3.26	1.15	3.22	0.97	long	no	ordered	low	bright	mixed
6		2.84	1.29	2.53	1.03	long	no	ordered	tall	delicate	single
7		3.29	1.24	3.38	0.98	long	yes	chaotic	low	bright	single
8		2.81	1.30	2.67	1.04	long	yes	chaotic	tall	delicate	mixed

\*\* : p<0.01; \* : p<0.05

**Table 24** Exp. A - Analysis of variance, influence of plot, trees, flower bed and the interactions between them on preferences in the case of Sofia

factor	F value
model	38.19 ***
plot	53.49 ***
trees	99.97 ***
flower bed	126.34 ***
plot x trees	0.73
plot x fl. bed	3.55 *
trees x fl. bed	4.17 *
plot x trees x fl. bed	0.40

\*\*\*:  $p < 0.001$ , \*:  $p < 0.05$

**Table 25** Exp. A - Comparisons of mean scores of the choices for plot, trees, flower bed in the case of Sofia

factor	levels	mean
plot	not present	1.23 a
	short	2.91 b
	long	3.19 c
trees	not present	2.45 a
	present	3.50 b
flower bed	not present	1.23 a
	soil	1.91 b
	grass	2.51 c
	flowers	3.72 d
	shrubs/hedge	4.06 d

Means with the same letters are not significantly different, according to Sheffé's multiple comparison procedure ( $p < 0.05$ ).

### c). Experiment C

In experiment C (Table 23) highest scores received a photomontage depicting mixed species of tall flowers with bright colours in short plot type with trees (photo No 4). Here as well, photomontages depicting tall flowers (photo No 2 and No 4) were rated significantly higher compared to the results from the survey in Sapporo.

## 3). Analysis of factors influencing preference and comparison of mean scores

### a). Experiment A

The analysis revealed that, highest influence on preferences had 'flower bed' followed by 'trees' (Table 24) whereas 'trees' had main influence on preferences for the respondents from Sapporo. Similar to the results from the survey in Sapporo, presence of trees and long plot type were preferred (Table 25). The group of photomontages depicting flowers received the highest mean scores. However, there was no significant difference between preferences for shrubs or flowers in the case of Sofia.

### b). Experiment B

The results from Experiment B showed 'trees' as having the highest influence on preferences (Tables 26) similarly to the results from Sapporo. Presence of trees was preferred, however, contrary to the results from Sapporo there was no significant difference either for preferences for plot type or for flower bed elements (Tables 27). Bulgarians respondents gave higher ratings to groups of tall flowers (*Althea sp.*) than Japanese respondents and rated lower groups of yellow and white flowers. Although there was no significant difference, the highest mean scores were for the photomontages depicting low red flowers.

**Table 26** Exp. B - Analysis of variance, influence of plot, trees, flower bed and the interactions between them on preferences in the case of Sofia

factor	F value
model	3.31 ***
plot	0.30
trees	83.81 ***
flower bed	1.50
plot x trees	0.20
plot x fl. bed	1.50
trees x fl. bed	0.74
plot x trees x fl. bed	0.20

\*\*\*:  $p < 0.001$ **Table 27** Exp. B - Comparisons of mean scores of the choices for plot, trees, flower bed in the case of Sofia

factor	levels	mean			
plot	short	3.18 a			
	long	3.22 a			
trees	not present	2.87 a			
	present	3.53 b			
flower bed	colour	species	height	arrangement	
	red	single	low	ordered	3.38 a
	purple	single	low	ordered	3.36 a
	mixed	single	low	ordered	3.33 a
	red	single	tall	moder. ord.	3.20 a
	mixed	single	tall	moder. ord.	3.20 a
	white	single	low	ordered	3.16 a
	mixed	mixed	differ	chaotic	3.13 a
	white	single	tall	moder. ord.	3.04 a
	yellow	single	low	ordered	3.02 a

Means with the same letters are not significantly different, according to Sheffé's multiple comparison procedure ( $p < 0.05$ ).

### c). Experiment C

According to Experiment C, among the factors affecting preferences 'trees' and 'arrangement' had equal F values followed by factor 'colour' (Tables 28). Similar to the results from Sapporo's survey presence of trees, ordered arrangement and bright colours were preferred. However, there was no significant difference for preferences for 'height' whereas in the case of Sapporo 'height' was the third main factor and low flowers were preferred than tall.

**Table 28** Exp. C - Analysis of variance, influence of plot, trees, arrangement, height, colour and composition on preferences and comparisons of mean scores in the case of Sofia

factor	levels	mean	F value
model			8.41 ***
plot	short	3.03 a	0.01
	long	3.05 a	
trees	not present	2.68 a	22.31 ***
	present	3.40 b	
arrangement	chaotic	2.68 a	22.31 ***
	ordered	3.40 b	
height	low	2.99 a	0.40
	tall	3.09 a	
colour	delicate	2.77 a	12.73 ***
	bright	3.31 b	
composition	mixed	2.98 a	0.70
	single	3.10 a	

\*\*\*:  $p < 0.001$ Means with the same letters are not significantly different, according to Sheffé's multiple comparison procedure ( $p < 0.05$ ).

## 4). Differences in preferences based on personal characteristics

### a). Occupation

In the case of Sofia students majoring in Landscape Architecture were not

surveyed therefore differences based on occupation were not investigated.

### b). Gender

Significant differences were found for one photomontage in Experiment A (photo No 1) and two in Experiment B (photo No 23 and 32). Women tended to give higher ratings for these photomontages (Table 29). The pictures in Experiment B depicted purple flowers with trees in short and long plot type respectively whereas the picture in Experiment A was the base without any planting models.

### c). Age

Differences based on age occurred for four pictures, all included in Experiment B (Table 30). Respondents of age 50–69 and over tended to rate photomontages depicting low flowers in long plot type (photo No 11, No 12 and No 13) and one photo depicting low flowers in short plot type (photo No 5) higher than respondents of age 30–49. All of these photomontages were without trees.

## D. Discussion

The results from this Chapter add to the literature related to landscape preferences which have demonstrated cultural differences in landscape appreciation between Asians and Westerns (Tips and Savasdisara, 1986a; Yang and Kaplan, 1990; Yu, 1995). Once again it was shown that people from different cultures share different preferences which should be considered by city planners and landscape architects in their projects.

**Table 29** Differences in preferences between men and women

photo No	men mean n=14	women mean n=17	t value
Experiment A			
1	1.00	1.41	-2.75 *
Experiment B			
23	3.36	4.12	-2.08 *
32	3.21	4.06	-2.33 *

\*: p<0.05

**Table 30** Differences in preferences between age groups in the case of Sofia

photo No	age	N	mean	F value
Experiment B				
5	10-29	12	3.33 ab	3.99 *
	30-49	13	2.46 a	
	50 and over	6	4.00 b	
11	10-29	12	2.75 ab	4.24 *
	30-49	13	2.08 a	
	50 and over	6	3.50 b	
12	10-29	12	2.83 a	7.88 **
	30-49	13	2.31 a	
	50 and over	6	4.17 b	
13	10-29	12	2.92 ab	4.80 *
	30-49	13	2.08 a	
	50 and over	6	3.83 b	

\*\* : p<0.01, \* : p<0.05

Means with the same letters are not significantly different, according to Sheffé's multiple comparison procedure (p<0.05).

While the presence of trees appeared to be the single most important factor throughout the three experiments in the case of Sapporo (Chapter III), the results from Experiment A in the case of Sofia revealed that factor flower bed had strongest influence on preference. Even though, among the possible elements for the space beneath trees, the group of photomontages depicting shrubs/hedge received the highest mean scores in the case of Sofia, preferences for flowers or shrubs/hedge were not significantly different. However, both results confirmed previous findings that combined types of street plantings were more preferred than only single trees (Fujiwara and Tashiro 1984; Matsuda et al. 1989; Abe et al. 1990; Shimomura 1994).

The results that 'country' was the factor having a significant influence on preferences for street-planting models, showed once again the effects of culture and one's upbringing environment on perception. In Bulgaria it is common to find shrubs and tall vegetation along streets or in the green spaces surrounding condominiums. Therefore people are used to see tall and chaotic vegetation. Low and ordered composition of flowers in the form of parterre, had been present in many parks in the past but not any more in the recent years due to fund limitations. On the other hand there are other factors which could have influenced preferences for photomontages depicting tall flowers. Some respondents from Sofia shared the opinions that continuous and dense plantings of shrubs along the sidewalk make pedestrians feel safer from traffic which is in contrast to the opinion of some of the respondents from Sapporo, most of whom thought that tall flowers reduce drivers visibility, thus exposing children on the sidewalk to danger. Therefore the relationship between the feeling of safety and street-planting models require further attention and detailed investigations. Another factor which could have influenced preferences for shrubs/hedge and tall flowers is the snowfall. The respondents from Sofia probably did not have the concern that shrubs need special care to survive through the winter since snowfalls in Sofia are not as heavy as in Sapporo. Factor 'country' and the interaction 'age x country' prove to be most influential on preferences. However, the fact that young people were dominant in both samples and that there were differences based on age, may have contributed to significance of the interaction 'age x country'. On the other hand, in the case of Sapporo were investigated differences between students majoring in Landscape architecture and Ornamental Horticulture and other respondents where factor 'age' might have had an influence as well. Yet another factor - attitudes to species *Althea rosea* may have affected preferences for tall flowers. In the city of Sapporo the species is often seen during summer and many respondents shared the opinion that they disliked the species which appear messy and unordered at the end of the summer when withered and left untended. However there was no such attitude among many of the respondents from Sofia where this species could also be seen very often during summer in the green spaces around condominiums. On the other hand in Bulgaria due to the

dry climate in summer the species does not grow too big neither does it interfere with pedestrians since it is not planted in the streets.

Combined as a whole, the results from both surveys in Sapporo and Sofia revealed that various colours of flowers were liked. However, presence of trees and arrangement of the flowers appeared to be the two most important factors influencing preferences in both cases according to Experiment C. However, in the case of Sapporo factor 'height' was more influential than 'colour', whereas in the case of Sofia factor 'colour' was more influential than 'height', and in particular there were no differences in preferences for both levels of 'height' - low or tall. In summary, respondents from Sapporo preferred ordered arrangements of low, single species of flowers of different colours, suggesting compact and tidy compositions. However preferences for street-planting models with flowers in case of Sofia were not so well-defined.

## **V. Analysis of attitudes towards street flowers in Sapporo**

### **A. Introduction and purpose of the study**

As already mentioned in Chapter I a few studies have demonstrated that in one way or another people are attracted to flowers (Schroeder, 1986; Jorgensen et al., 2002; Akbar et al., 2003). As a case study in Kobe showed that residents were more actively participating in the maintenance of parks with flower beds than in parks without (Iwamura and Yokohari, 2001). Therefore such outcomes should be given more attention. Flowers can be seen on many residential streets and national roads in Sapporo and other cities in Hokkaido and there is evidence that flowers are planted by the citizens supported by the relevant administration (Forum of the Road Repair Cases from the North, 2000; Attractive North Community Planning, 2003). It is obvious that there are many residents interested in flowers. However it is important to understand residents attitudes towards street flowers and how can residents be grouped according to their attitudes towards street flowers. Any kind of information related to the promotion of street flower-planting can be useful for landscape architects and city administration in their mutual attempts to beautify residential areas, and in particular residential streets.

The overview provided in Chapter II showed that in many areas in Japan residents voluntarily get involved in street flower-planting activities. The results in Chapter III and Chapter IV showed that street-plantings models with flowers generally received high ratings even though there were cultural differences and Bulgarian respondents gave higher ratings to compositions with hedges or shrubs. However since in many areas in Japan residents are involved in street flower-planting it is important to understand their attitudes towards street flowers and their opinions on various issues related to street flowers. Therefore Chapter V has the following three objectives: (1) to understand what are resi-

dents' attitudes towards street flowers and assess to what extent flowers are seen as contributing to the aesthetic quality of a street; (2) to investigate residents' prior experience and willingness to participate in street flower planning, planting and maintenance; (3) to analyse opinions about how street flower planning, planting and maintenance should be tended and what should be done to motivate residents' participation. The subjects of this survey were residents living in an area where street flowers have been planted yearly since 1991.

## B. Methodology

The survey was carried out in the Satsunae area of Higashi Naebo, Eastern Sapporo. The Eastern district of Sapporo is known for having streets decorated with flowers. Another reason to choose this site was that in 1996 a committee was established in the area which was organizing activities related to increasing the area's greenery flowers with the help of the residents.

At the end of December 2000, a questionnaire was delivered to 262 randomly chosen households which is about 54% of the 485 households situated in the Satsunae area. The questionnaire was handed out face-to-face to 162 households and then collected. An additional 100 copies with a stamped addressed envelope were left in the post boxes of the households where the doorbell was unanswered. The total valid responses resulted in an overall sample size of 184 people (a 70% response rate).

The questionnaire concerned attitudes to street flowers and the items could be summarised as follows (for details see Table 32):

1) One question estimating emotional attachment to the neighbourhood.

2) Opinions regarding street flowers: who should carry out the planning, planting and maintenance.

3) Residents' involvement with street flowers: their willingness to participate; participation experience; reasons if un-

**Table 31** Demographic characteristics of the respondents in Higashi Naebo

item	category	n	%
Age	20-39	38	21.1
	40-59	83	46.1
	60 and over	59	32.8
Gender	male	57	32.6
	female	118	67.4
Dwelling type	self-owned detached house	140	77.8
	rented apartment	30	16.7
	other	10	5.6
Occupation	housewife	68	38.4
	pensioner	39	22.0
	other	70	39.5
Years of residence	more than 10 years	111	61.7
	less than 10 years	69	38.3
Plans for future residence	plan to stay	108	61.4
	sooner or later will move	27	15.3
	do not know	41	23.3
Attachment to the neighbourhood	attached	71	39.2
	somewhat	62	34.3
	neither nor	39	21.5
	not really	6	3.3
	not attached	3	1.7

willing to participate.

4) Attitudes to street flowers. Respondents were asked to rank eleven statements related to street flowers, on a five-step rating scale from “strongly agree” (5) to “strongly disagree” (1).

5) Demographic characteristics of the respondents – age, gender, dwelling type, occupation, years of residence, plans to move.

Dominating the sample (46%) were people in their 40s and 50s (Table 31). Respondents in their 20s and 30s made up 21%, while 33% were 60 or over. There were twice as many women in the sample as men – respectively 67% and 33%. Most of the respondents (78%) were living in self-owned detached houses, and just 17% in rented apartments. Many of those surveyed (62%) had been living in the neighbourhood for more than 10 years, and 61% stated that they had no plans to move to another place. Housewives constituted 38% of the respondents, and pensioners 22%. In response to the question about emotional attachment to their neighbourhood, 74% answered that they were “attached” or “somewhat attached”. This can be seen as being consistent with the large number of people in their middle age, with self-owned houses, long-term residence, and no plans to move.

## C. Results

### 1). Attitudes to street flowers – factor analysis

Among the items related to attitudes towards street flowers, the strongest agreement (responses 5 or 4 on the five-point scale) was with the statement that *‘street flowers make streets look beautiful’* (94%), followed by *‘street flowers give a street a natural appearance’* (81%). About 47% of the respondents disagreed (responses 2 or 1) with the statement that *‘street flowers are not a matter of interest for those who have gardens’*. Half (51%) of the respondents agreed that *‘a front garden should be tended so as to improve the streetscape’* (Figure 5).

Factor analysis of the variables related to street flowers led to four factors being retained, based on the criterion of selecting eigenvalues greater than one. Varimax rotation of the first four principal components revealed four underlying factors explaining 59.3% of the variance. The four underlying factors could be interpreted as ‘effort to maintain’, ‘socio-environmental’, ‘aesthetic value/closeness to nature’, and ‘privacy issues’ (Table 32).

**a). Factor I:** ‘Effort to maintain’ includes the variables: *‘street flowers are difficult to maintain’*, *‘street flowers are expensive to maintain’* and *‘street flowers are not very pleasant when withered’*. This factor explains 16.5% of the variance.

**b). Factor II:** ‘Socio-environmental’ accounts for 15.7% of variance, and summarises the variables *‘street flowers provide opportunities for planting flowers for those who have no gardens’*, *‘a front garden should be tended so as to improve the streetscape’*, *‘street flowers provide opportunities for communication among*

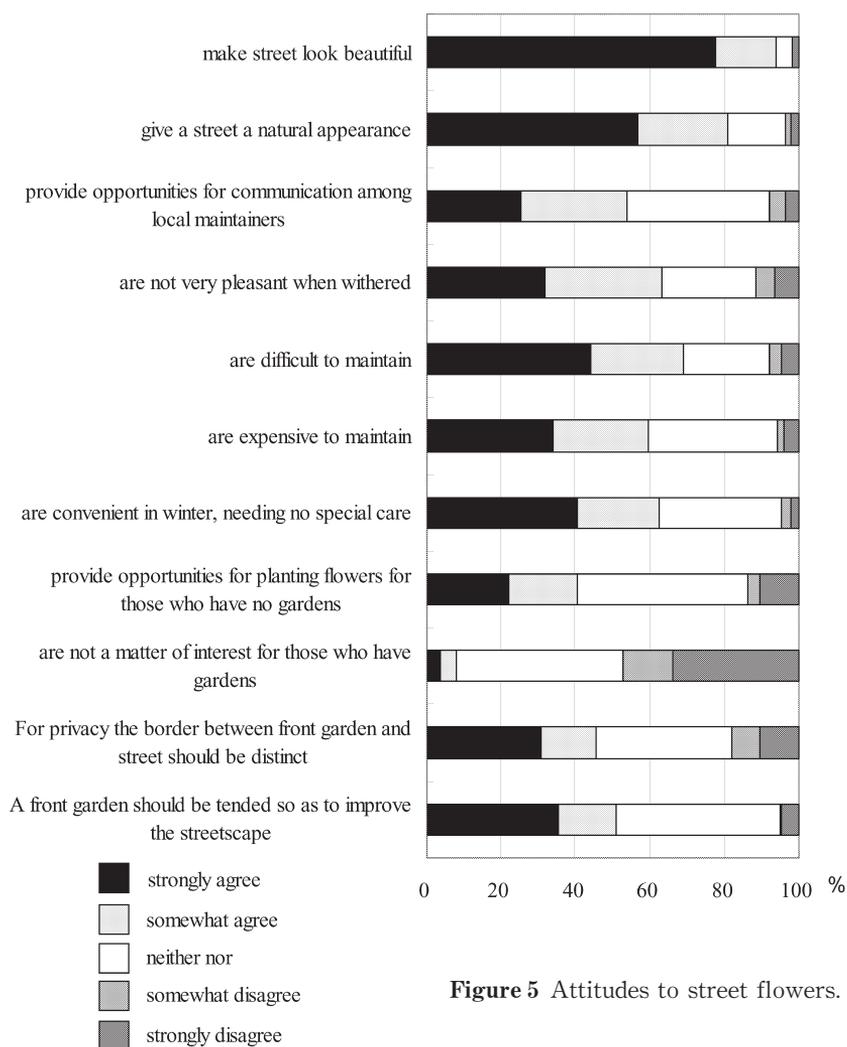


Figure 5 Attitudes to street flowers.

*local maintainers*' and *'street flowers are convenient in winter, needing no special care'*.

**c). Factor III:** 'Aesthetic value/closeness to nature' includes the variables: *'street flowers make streets look beautiful'* and *'street flowers give a street a natural appearance'*.

**d). Factor IV:** 'Privacy issues' is so named since the statements it relates to are: *'for privacy the border between front garden and street should be distinct'* and *'street flowers are not a matter of interest for those who have gardens'*, with the first statement carrying the higher factor loading (Table 32).

**e). Demographic analysis:** There was significant difference between male and female respondents regarding three of the statements: *'street flowers are expensive to maintain'*, *'for privacy the border between front garden and street should be distinct'* and *'a front garden should be tended so as to improve the*

**Table 32** Factor analysis of the variables related to street flowers and front gardens

Street flowers:	I	II	III	IV	commu- nality	mean scores
	factor loadings					
<b>I: effort to maintain</b>						
are difficult to maintain	0.84	-0.09	0.03	0.06	0.71	4.00
are expensive to maintain	0.81	-0.03	0.15	0.01	0.69	3.84
are not very pleasant when withered	0.62	0.07	-0.17	0.16	0.44	3.77
<b>II: socio-environmental</b>						
opportunities for planting flowers for those who have no gardens	-0.03	0.78	0.16	-0.19	0.67	3.38
A front garden should be tended so as to improve the streetscape	0.01	0.64	0.15	0.25	0.49	3.76
provide opportunities for communication among local maintainers	-0.05	0.59	0.39	-0.12	0.52	3.68
are convenient in winter, needing no special care	0.00	0.55	-0.12	-0.03	0.32	3.96
<b>III: aesthetic value/closeness to nature</b>						
make streets look beautiful	-0.12	0.10	0.83	0.07	0.71	4.68
give a street a natural appearance	0.15	0.12	0.78	-0.11	0.66	4.32
<b>IV: privacy issues</b>						
...the border between front garden and street should be distinct	0.07	-0.12	0.16	0.82	0.73	3.48
are not a matter of interest for those who have gardens	0.16	0.06	-0.31	0.67	0.58	2.30
Contribution of each factor (%):	16.45	15.73	15.36	11.73	59.27	
□ : factor loadings>0.40						

*streetscape*'. Men tended to agree more with these statements than did women (Table 33).

## 2). Residents division into groups based on attitudes to street flowers – cluster analysis

Ward's method of cluster analysis was used to divide respondents into groups based on their scores for the above factor analysis. This resulted in three clusters (Figure 6).

**a). Cluster 1:** Contains the respondents with negative factor scores on the 'effort to maintain', 'socio-environmental' and 'aesthetic value/closeness to nature' factors, and neutral on the 'privacy issues' factor. This cluster was the smallest, containing 37 people. In the discussion below, this is characterised as the 'negative attitudes' cluster.

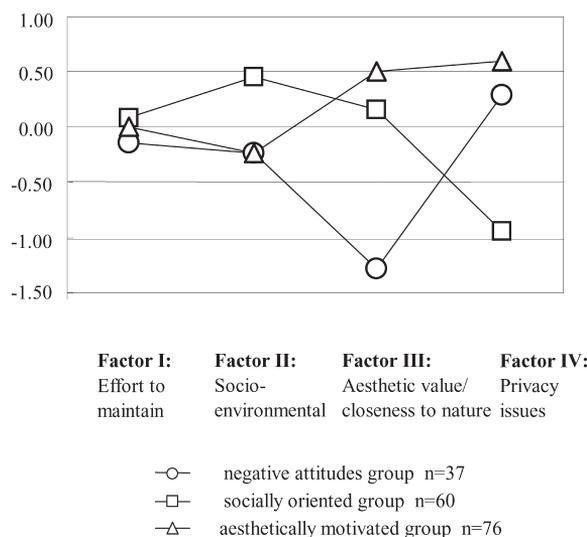
**b). Cluster 2:** Contains the respondents with positive factor scores on the 'socio-environmental' factor, negative on the 'privacy issues' factor and neutral on the other two. This is referred to as the 'socially oriented' cluster, containing 60 people.

**c). Cluster 3:** Consists of the respondents with positive mean on 'aesthetic value/closeness to nature' and 'privacy issues' factors, negative on the 'socio-

**Table 33** Differences in attitudes between men and women

Variable	men n=55	women n=113	t value
are expensive to maintain	4.09	3.70	2.30 *
...the border between front garden and street should be distinct	3.75	3.34	1.95 *
A front garden should be tended so as to improve the streetscape	4.04	3.63	2.31 *

\*: p<0.05



**Figure 6** Clusters based on factor scores.

environmental' factor and neutral on 'effort to maintain'. This is the largest cluster, with 76 people. It is referred to as the 'aesthetically motivated' cluster, since the respondents appear to be aesthetically appreciative but also concerned about their privacy.

Comparing the factor-score means among the clusters (Table 34) there was no significant difference among the three for factor I ('effort to maintain'). For the remaining factors, Cluster 2 always differed significantly from the other two, and

**Table 34** Comparison of factor-score means between the clusters

factors	clusters	n	means	F value
<b>I</b> effort to maintain	1	37	-0.142 a	0.59
	2	60	0.085 a	
	3	76	0.002 a	
<b>II</b> socio-environmental	1	37	-0.244 a	10.55 ***
	2	60	0.455 b	
	3	76	-0.240 a	
<b>III</b> aesthetic value/ closeness to nature	1	37	-1.281 a	76.54 ***
	2	60	0.149 b	
	3	76	0.506 c	
<b>IV</b> privacy issues	1	37	0.284 b	79.60 ***
	2	60	-0.937 a	
	3	76	0.602 b	

\*\*\* :  $p < 0.001$

Means with the same letters are not significantly different, according to Sheffé's multiple comparison procedure ( $p < 0.05$ ).

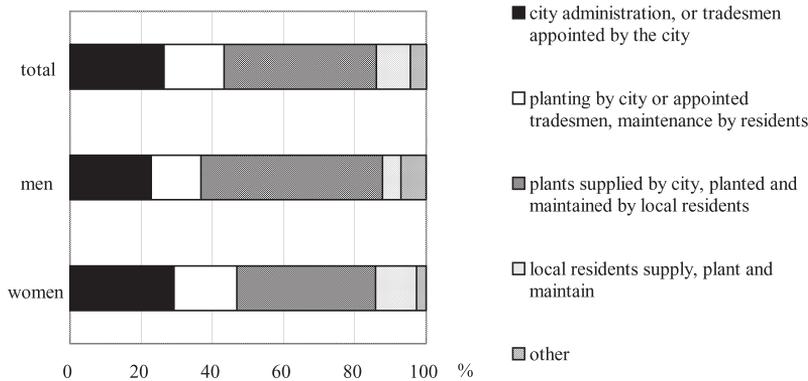
in particular on factor III ('aesthetical value/closeness to nature') all clusters differed.

The analysis for the relationship between clusters and respondents' characteristics revealed that only age of the respondents was significantly related (Table 35). Cluster 1 and Cluster 3 had the same age distribution, containing more people of age 60 and above compared to Cluster 2, where the majority of the people were in their 40s and 50s (Figure 7). Cluster 1 had a higher proportion of men than the other two clusters, though this was not statistically significant.

**Table 35** Chi-square test - Relationship between clusters and demographic characteristics

item	Cramer's V
gender	0.079
age	0.182 *
years of residence	0.075
dwelling type	0.059
occupation	0.115
plans to move	0.059

\* p<0.05



**Figure 7** Opinions on who should tend street flowers.

### 3). Opinions on issues related to street flower-planting and maintenance

#### a). Who should be involved

Regarding opinions on who should carry out street flower planning, planting and maintenance, 43% of the respondents chose the suggestion that plants should be supplied by the city administration, with residents carrying out planting and maintenance (Figure 8). These included a higher proportion of the men than of the women, although the difference was not statistically significant. On the other hand, of the few people who favoured having residents take care of everything (obtaining plants, planting and maintaining), the proportion of women was higher. The second most frequently chosen was the suggestion that street flowers should be handled by the city administration or by tradesmen appointed by it (26%).

Three of the items suggesting residents' involvement in one form or another were combined, to create just two alternative opinions - everything to be handled by the city administration or its appointed tradesmen, versus having at least some

residents' involvement. Cluster-related analysis of these opinions revealed a significant relationship (Table 36). The highest percentage of people proposing no residents' involvement was within the 'negative attitudes' group (Cluster 1); next were the members of the 'aesthetically motivated' Cluster 3, while the greatest support for some kind of involvement corresponded to the 'socially oriented' Cluster 2 (Figure 8).

**b). How to motivate participation**

'City supplying residents with plants' was chosen by 55% of respondents as a way to motivate residents' involvement in street flower-planting and maintenance. It was the most popular option overall, and within each cluster (Figure 9). Next, at 28%, was the suggestion 'city sponsoring participating citizens and groups'. This was especially popular within the 'socially motivated' Cluster 2, which also provided the greatest support for having the city supply pamphlets with information on street flowers. The 'negative attitudes' Cluster 1 showed the highest percentage of "don't know" responses to this question.

**4). Willingness to participate**

Although there is an evidence of residents participation in street flower-

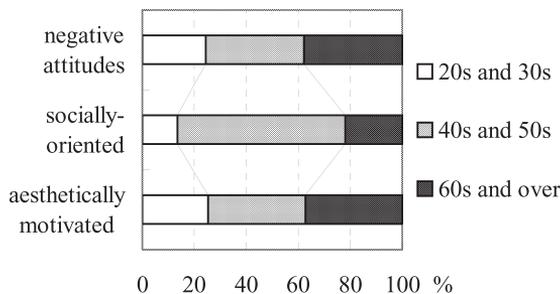


Figure 8 Age distribution.

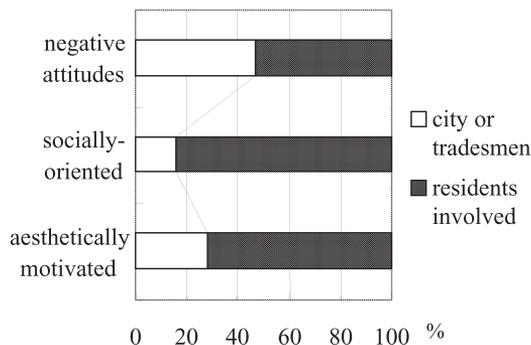
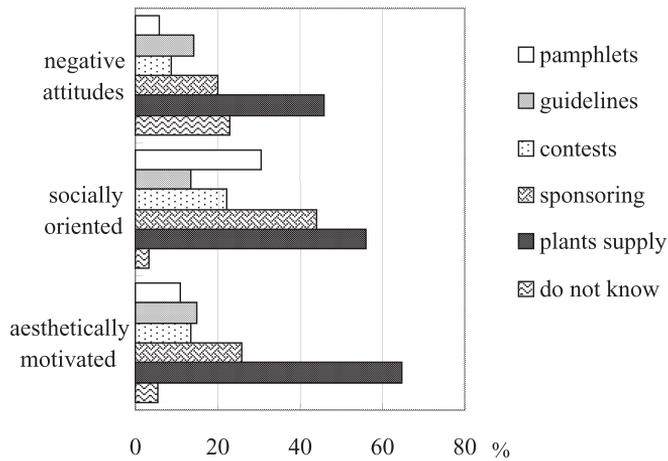


Figure 9 Who should carry out street flower-planting and maintenance.

Table 36 Chi-square test - Relationship between given responses and clusters

item	Cramer's V
attachment to the neighbourhood	0.166
who should tend street flowers	0.250 **
<u>willingness to participate</u>	
in planning	0.131
in planting	0.152
in maintenance	0.192 *
<u>experience</u>	
in planning	0.168
in planting	0.059
in maintenance	0.061
<u>how to motivate residents to participate</u>	
providing pamphlets	0.278 **
providing guidelines	0.016
organising contests	0.143
sponsoring participators	0.214 *
supplying plants	0.148
do not know	0.271 **

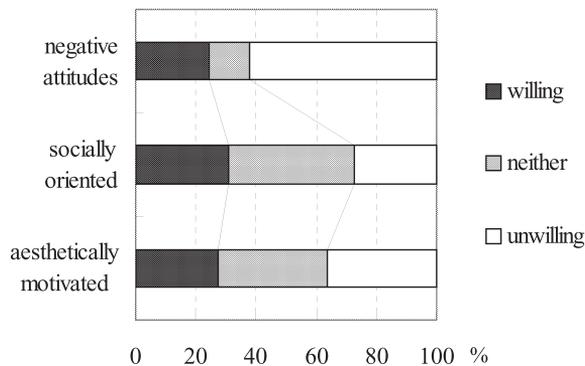
\*\* p<0.01 \* p<0.05



**Figure 10** How to motivate residents to become involved.

planting in this area, fewer than 20% of the respondents stated they had had such experience (Figure 10). Of those who did, the highest percentage of experience was in the planting (15%) activities, maintenance was next (13%), and planning was the lowest (just three people). It was notable that the proportion of the membership of the supposedly ‘negative attitudes’ Cluster 1 who had some experience was almost the same as for the other two clusters, and even slightly higher than the ‘socially oriented’ Cluster 2.

Fewer respondents expressed a willingness to participate in planning (18%) than in either planting (34%) or maintenance (28%). The people in the ‘negative attitudes’ cluster were generally less willing to participate in any aspect, but a significant relationship was established only in regard to maintenance (Table 36, Figure 11). This cluster had the highest proportions of clear ‘unwilling’ responses, where the other clusters included large proportions of ‘neither willing nor unwilling’.



**Figure 11** Willingness to participate in maintenance.

Among the respondents unwilling to participate in any aspect (40%), the most frequently stated reason for being so was 'lack of time' (51%). Other reasons chosen with equally balanced frequencies (22% each) were 'lack of interest', 'too much bother' and 'others'. In the item called 'others', which was an open-ended question, reasons given included poor health conditions, advanced age, taking care of small children etc. For those willing to participate, the options most frequently chosen for suitable meeting time and place were neighbourhood hall, on weekend mornings.

#### **D. Discussion**

It should be emphasised that compared to previous studies, this survey addressed residents, who did or did not have prior involvement with street flowers. Although flowers are planted yearly in the Satsunae area of Higashi Naebo, with the help of the local residents, those surveyed were neither directly involved in activities related to street flowers nor a volunteer group.

One goal of this survey was to investigate what are residents attitudes towards street flowers and the results showed that flowers were seen as contributing to the aesthetic quality of a street, though respondents showed awareness that the management of street flowers involves some effort. At the same time, there was acknowledgement that flowers also serve as a means for communication among residents, through the process of planting and maintenance. Respondents also showed awareness that flowers are convenient in winter. The agreement that front gardens should be tended so as to improve the streetscape, concurs with findings of a study carried out in Megumino town, Hokkaido, that addressed attitudes towards private gardens and where a group showed sensitivity to the contribution of their gardens to the streetscape. These people were motivated to tend their gardens not merely as a means of supplying food, but rather as a source of psychological benefits and human interchange (Kawane et al., 2000).

Another goal of this survey was to investigate the potential willingness of residents to participate in activities related to street flowers. Overall, it could be concluded that the respondents were relatively willing to participate except those in Cluster 1, who appeared to be not so appreciative towards street flowers and most clearly stated their unwillingness. It is encouraging though, that they formed the smallest cluster in the survey. Those who appeared to be socially oriented (Cluster 2) were more positive than the aesthetically motivated ones (Cluster 3) and it appears that people in either of these groups might be easily encouraged to participate.

This survey concentrated particularly on street flowers and addressed only residents' point of view, but its results proved to be consistent with findings of previous surveys addressing residents as well as city administration in activities related to urban landscaping. The importance and need of support provided by the city, information supply and announcement of examples of residents' partici-

pation, as well as consideration of the design, had been seen as essential by the city administration to obtain successful residents' participation (Let's start! Flower and Greenery Community Planning, 2000).

However, the reality in Japan shows that at many places residents do not make a difference between public and private space and many of them consider the street space in front of their homes private, thus making the establishment of a partnership between residents and administration difficult. Residents should clearly understand that the space in front of their homes is still public, whereas administration should understand that residents are not indifferent towards this space. In order to serve people more effectively, city administration should carefully consider their opinions, especially when community issues are concerned. The administration could motivate residents and work in cooperation with them by providing plants and sponsorship. Therefore partnership is essential and instead of being restricted it should be promoted since this is an easier and cost-effective way to make our cities more beautiful. As found in previous studies, facilitating cooperation between designers and citizens is important for enhancing long-term urban livability (Crewe, 2001) and citizen participation is essential if projects are to enjoy long-term success (Hudspet, 1986).

In conclusion, flowers were seen as contributing to the aesthetical quality of a street by the majority of the residents, who were also relatively willing to participate, which is encouraging for the administration in its attempts to promote residents' involvement in street flowers.

#### **IV. Structure and characteristics of resident involvement in street flower-planting and maintenance**

##### **Part I: A survey of residents from two areas in Sapporo**

###### **A. Introduction and purpose of the study**

In the recent years residents have been getting involved in various projects of improvement of the city environment and many studies have discussed the benefits of citizen participation (McPherson and Johnson, 1988; Kaplan and Kaplan, 1989; Jones, 1999; Taylor, 2000; Manns and Wood, 2002).

Recently in Hokkaido there is an increased citizen involvement in flower-planting activities and in many cities there are volunteer groups or organizations established to organize and carry out such activities. Those participating are usually members of such organizations but in some areas residents participate without being members of organizations. Therefore there are various patterns of participation and people of different ages take part in street flower-planting. It should also be noted that elementary and junior high school students often participate in such activities beautifying the areas surrounding their schools by planting flowers and later taking care of the plants. Such volunteer groups or organisations are usually supported with funding and plant supply by the relevant

administration which is in most cases city or ward administration, Hokkaido Regional Bureau for Construction and Development, or Public Works Office. Funds are also provided by retail shops, banks and hospitals, and sometimes by members.

In the previous chapters was discussed that the majority of those surveyed appreciated flowers for their aesthetic contribution to streetscapes. The analysis of preferences (Chapter III, Chapter IV) showed that street-planting models with flowers were rated high even though there were some cultural differences. The analysis of attitudes towards street flowers (Chapter V) also showed that street flowers were appreciated mostly for their aesthetic contribution to streetscape quality. However, furthermore it is necessary to survey those directly involved in street flower-planting and to understand their motivations and attitudes, as well as the problems they face and their opinions on various street flower-planting issues in order to further promote street flower-planting activities.

In the first part of this chapter, the motivations of residents from two areas of Sapporo - Higashi Naebo and Tokiwa, who have directly participated in street flower-planting are discussed. In Higashi Naebo, street flower-planting and maintenance activities have been continuing for more than 12 years and have been supported by the Sapporo city, whereas in Tokiwa, such activities have been continuing for the last three years and have been supported by the Sapporo Development and Construction Department. One aim to undertake this survey was to analyse the motivations of two different samples of residents involved in street flower-planting, which differed in terms of participation continuation (long-term and short-term), support provider (Sapporo city and Sapporo Development and Construction Department, Hokkaido Development Bureau, Ministry of Land, Infrastructure and Transport) and participation pattern, i.e. how participants are organized, are they members of the organization, how are they informed, do they discuss issues related to street flower-planting, how flower species are decided. Another aim was to analyse the opinions of those directly involved in street flower-planting and maintenance on issues related to street flowers.

The subjects of the surveys were (1) participants from the Eastern district of Sapporo, Higashi Naebo, where flowers have been planted for about 12 years and (2) participants from the Southern district of Sapporo, Tokiwa, where flowers have been planted since 2000 by a newly established volunteer organisation.

## **B. Methodology**

In June 2002, 400 questionnaires were delivered in the area of Higashi Naebo to the residents who had just planted flowers on the streets in the neighbourhood, and a week later in a similar way, 150 questionnaires were delivered in the area of Tokiwa. In both cases the participants were local residents who voluntarily

plant and maintain flowers over a long distance street with a heavy traffic. In both areas mainly annual flowers are planted, and mostly *Petunia* sp. However, the participation pattern, continuance and support provider, as discussed above, differ.

### 1). Characteristics of the surveyed areas

**a). Higashi Naebo:** The area is situated in the Eastern part of Sapporo which has the reputation of having streets decorated with flowers. Land use in the area is mainly residential, mixed with commercial on the background of agricultural land. The relief of the area is flat. Street flowers have been planted in the area since 1991. Nowadays the activity is organized by the “Moere community planning committee” (モエレまちづくり委員会) which was established in 1996. The pattern of participation is the following: the head of the committee and committee members select the flowers and supply them to the residents. On the day chosen for planting, flowers are left on the streets early in the morning and a few hours later residents plant them. Flowers are planted mainly on the Sankakuten street (三角点通) which has an intensive traffic, but also in some inner neighbourhood streets. The total distance of the road decorated with flowers is about 6km. The flower beds are mostly of a short type (approximately 80cm wide and 1.5-2m long). However, in some places long flower bed types are also present (up to approximately 5m long). Flower seedlings are planted once a year, at the beginning of June and are periodically maintained throughout the season. Residents from different neighbourhood associations in the area participate, having been informed about the event by the heads of these associations. Following planting the flowers are voluntarily maintained by residents in the area. The “Moere community planning committee” is supported by Sapporo city. Additional funds are provided by some banks and retail stores situated along the street, who receive beautifully arranged flowerpots in return. Once flowers are planted they are voluntarily maintained by the residents in the area. The committee is also engaged in other activities, including tree-planting; supporting festivals and events in the area; improving partnerships between residents, administration and companies; and holding area-related presentations and symposiums (information extracted from the committee regulations).

The area of Higashi Naebo was chosen for the survey since the streets in the neighbourhood have been decorated with flowers for more than 12 years and every year more than 400 people in the neighbourhood assemble together to plant flowers.

The information about the area’s characteristics and participation conditions was obtained through personal communication with the head of the committee.

**b). Tokiwa:** The area is situated in southern Sapporo. Land use is mainly residential mixed with commercial on the background of forests. The relief of

the area is mountainous and the road is situated in a narrow space. National road 453, which carries intensive traffic, is the main road in the area. The total distance of the road decorated with flowers is about 2.5km. The flower beds are of a long type (approximately 50–70cm wide with lengths differing between 5 to 50m or more). Flower seedlings are planted once a year and are maintained periodically each month. Up until 1998 flowers on the road were planted and maintained by the neighbourhood association and funded by the city administration. However due to fund limitations and the advanced age of association members a decision was made to cover flower beds with asphalt and to end flower-planting activities on that road. But the idea did not appeal to the residents in the area and in 2000 some of them established an organization called “Making the flowers bloom on the Art park flower road” (芸術の森フラワーロードに花を咲かせる会) with the purpose to once again decorate the main street in the neighbourhood with flowers. Starting with 69 members in 2000, there are now around 164 members of this organization who by their collective efforts and with the help of the Sapporo Development and Construction Department (Hokkaido Development Bureau) contribute to enhance the aesthetic quality of the main street in the neighbourhood which is as well an important national road. At present the organization is supported by the Sapporo Development and Construction Department which annually supplies flower seedlings to the organization. Additional funds are gathered by the hospitals along the road in exchange for flower decorations. There are also individual and member donations. Flower seedlings have also been provided by the Southern Ward’s Public Works Office, Sapporo city. The members of the organization also grow flowers from seeds.

The information about the area’s characteristics and participation conditions was obtained through personal communication with the representative of the organisation.

## 2). Questionnaire survey

The aim of the survey was to analyze participant’s motivations in order to find a clue to the successful residents involvement in issues related to street beautification. Surveying the participants can also help to understand the problems they face as well as their opinions on issues related to street flowers.

The questionnaire consisted of three parts and was three pages in length, printed on A3 sheets of paper. The first part asked the participants about participation frequency, motivations to participate and about the problems they face. The items were constructed as multiple choice. To inquire about motivations, respondents had to rank 12 items on a five-step rating scale ranging from ‘strongly agree’ (5) to ‘strongly disagree’ (1). The second part asked participants about their opinions on who should take care of street flower-planting and maintenance, how to involve more participants and there were 11 items respon-

dents had to rank on a five-step rating scale in order to investigate their attitudes to street flowers. The third part contained questions related to personal characteristics such as gender, age, occupation, dwelling type and years of residence.

### 3). Demographic profile of the respondents

**a). Higashi Naebo:** Questionnaires were handed out to the heads of the neighbourhood associations who handed them to residents who went out on the 9<sup>th</sup> of June 2002 to plant flowers. In total 400 copies were delivered to participants from 10 neighbourhoods in the area. Responses were collected from the head of the committee who received them from the heads of the neighbourhood associations. The response rate was 49% or in other words 195 valid questionnaires were collected. Most respondents were women (59%) and half (50%) the respondents were in their 50s (Table 37). Distributed according to occupation, 29% of the respondents were pensioners and 27% were housewives. Most of the surveyed had lived in the neighbourhood for over 20 years and had no plans to move (69%) which explains the strong feeling of attachment to the neighbourhood shown by most of the respondents (84%). Eighty percent of those surveyed lived in detached houses and 62% of the respondents were also taking care of flowers in their own gardens.

**b). Tokiwa:** In Tokiwa the response rate was 43%. From 150 questionnaires handed out to representative of the “Making flowers bloom on the Art park flower road” group, 64 valid responses were received. Responses were collected with the help of the representative of this organisation. The demographic characteristics of the participants from Tokiwa were to a great extent similar to those from Higashi Naebo. The majority were women (73%), as well as people in their 60s and over (53%), followed by those in their 50s (25%). Most of the participants in Tokiwa were housewives (33%) and pensioners (28%). The majority of respondents (36%) had lived in the neighbourhood for over 20 years or between 10–20 years (33%), and had no plans to move (77%). The feeling of attachment to the neighbourhood was also strong – 84% of those surveyed agreed they were attached to it. Eighty percent lived in their own detached houses and about 66% were taking care of flowers in their gardens.

**Table 37** Demographic characteristics of the participants

item	category	H. Naebo Tokiwa	
		%	
gender	men	36.4	26.6
	women	59.0	73.4
	NA	4.6	-
age	10-29	10.3	7.8
	30-49	37.9	14.1
	50-69 and over	51.8	78.1
dwelling type	detached house	79.5	79.7
	other	17.9	20.3
member	yes	3.1	81.3
	no	89.2	15.6
	NA	7.7	3.1

NA: not available

## C. Results

### 1). Participation frequency

(a) For the majority of participants in Higashi Naebo (36%) this was their 2<sup>nd</sup>, 3<sup>rd</sup> or 4<sup>th</sup> time to plant flowers and 35% had participated more than 5 times since the activity has started. However, most respondents did not maintain the street flowers (39%), with a few maintaining them about once or twice a month (23%) or once or twice a season (23%). Most of those (89%) who went out to plant flowers on June 9<sup>th</sup> were not members of the “Moere community planning committee”.

(b) The majority of the surveyed in Tokiwa were participating for the 2<sup>nd</sup>, 3<sup>rd</sup> or 4<sup>th</sup> time (38%) and 25% participated for the first time since the activity began. Many of them (81%) were members of “Making flowers bloom on the Art park flower road”. Most of those involved (34%) were maintaining the flowers once or twice a season or once or twice a month (27%).

### 2). Motivations of residents voluntarily involved in street flower-planting

**a). Higashi Naebo:** In this area people were motivated to participate mostly because flowers *‘make streets look beautiful’* (mean 4.67) and also because they were *‘attracted to flowers’* (mean 4.11) and were *‘satisfied after planting flowers’* on the street (mean 4.14). They as well agreed that being involved in street flower-planting and maintenance *‘increases the attachment to the neighbourhood’* (mean 4.35) and provides *‘opportunity for communication among local residents’* (mean 4.05) Table 38.

The 12 items inquiring about motivations to participate and awareness of participation benefits were analysed by factor analysis. A principle factor analysis with Varimax rotation revealed 3 factors accounting for 66.5% of the total variance (Table 38). The first factor explains 27.8% of the variance and could be named “psychological benefits”. The second one named “socially oriented motives” explains 20.1% of the variance. The third factor accounts for 18.6% of the variance and summarizes variables related to street beautification issues and can be named “attachment to the neighbourhood and aesthetic benefits”. The item that participation *‘provides opportunity for communication among local residents’* which would have fitted better the second “socially oriented motives” factor, proved to be least correlated to the ‘socially oriented’ items contained by the second factor.

**b). Tokiwa:** In this area people seemed to be more enthusiastic than participants in Higashi Naebo. As a whole their rankings for the items related to motivations were significantly higher than those of the participants in Higashi Naebo. Significant differences were found for all the items except the following two *‘being involved in street flower-planting and maintenance increases attachment to the neighbourhood’* and *‘being motivated because friend/neighbours are participating’* (Table 39). Respondents from Tokiwa were mostly motivated to

**Table 38** Factor analysis of the items related to participation motives in Higashi Naebo

items related to street flower planting and maintenance	I	II	III	commu- nality	mean score	comparison with Tokiwa
	factor loadings					
<b>I: psychological benefits</b>						
nice physical exercise	0.79	0.35	0.09	0.75	3.69	***
attracted to flowers	0.78	-0.02	0.37	0.74	4.11	***
satisfied after planting flowers	0.72	0.20	0.34	0.67	4.14	***
increases knowledge about flowers	0.63	0.35	0.36	0.64	3.80	***
opportunities for communication among local residents	0.62	0.28	0.36	0.60	4.05	***
nice way to spend some free time	0.61	0.51	-0.03	0.63	3.46	*
<b>II: socially oriented motives</b>						
deepens interchange between residents and administration	0.14	0.82	0.20	0.73	2.98	***
friends/neighbours are participating	0.16	0.74	0.11	0.58	3.16	
makes the neighbourhood famous	0.42	0.65	0.24	0.65	3.05	***
<b>III: attachment to the neighbourhood and aesthetic benefits</b>						
increases attachment to the neighbourhood	0.09	0.24	0.81	0.73	4.35	
makes streets look beautiful	0.36	-0.02	0.73	0.67	4.67	*
increases responsibility towards neighbourhood's beautification	0.31	0.30	0.64	0.59	3.99	**
Variance explained by each factor (%)	27.83	20.08	18.58	66.49		

\* shows where significant differences were found when comparing mean scores of participants from Tokiwa and H. Naebo.

\*\*\*p<0.001 \*\*p<0.01 \*p<0.05

□ : factor loadings>0.40

**Table 39** Factor analysis of the items related to participation motives in Tokiwa

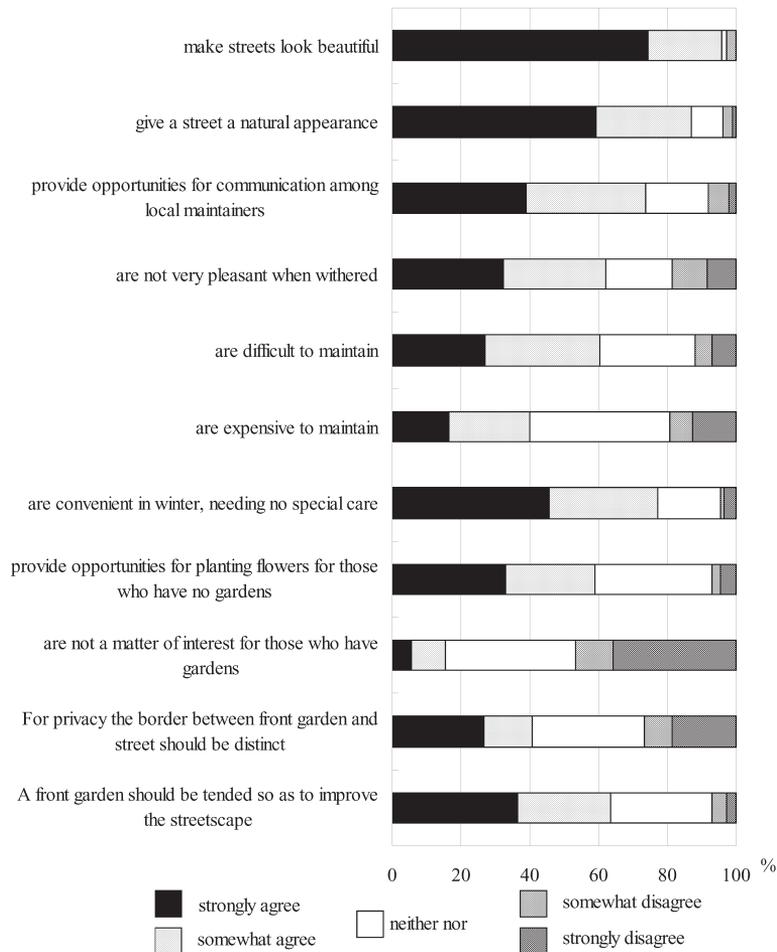
items related to street flower planting and maintenance	I	II	III	commu- nality	mean score	comparison with H. Naebo
	factor loadings					
<b>I: psychological benefits</b>						
opportunities for communication among local residents	0.77	0.17	0.04	0.62	4.65	***
satisfied after planting flowers	0.74	0.33	0.09	0.66	4.57	***
nice physical exercise	0.71	0.02	0.44	0.70	4.23	***
attracted to flowers	0.68	0.39	0.11	0.62	4.52	***
increases knowledge about flowers	0.55	0.39	0.22	0.50	4.38	***
makes the neighbourhood famous	0.47	0.30	0.45	0.51	3.58	***
<b>II: attachment to the neighbourhood and aesthetic benefits</b>						
makes streets look beautiful	0.22	0.84	-0.03	0.75	4.82	*
increases attachment to the neighbourhood	0.28	0.79	0.16	0.72	4.52	
increases responsibility towards neighbourhood's beautification	0.30	0.73	0.17	0.66	4.36	**
<b>III: socially oriented motives</b>						
deepens interchange between residents and administration	-0.23	0.45	0.73	0.80	3.48	***
friends/neighbours are participating	0.21	-0.13	0.72	0.58	3.30	
nice way to spend some free time	0.37	0.19	0.60	0.53	3.87	*
Variance explained by each factor (%)	25.50	22.08	16.25	63.83		

\* shows where significant differences were found when comparing mean scores of participants from Tokiwa and H. Naebo.

\*\*\*p<0.001 \*\*p<0.01 \*p<0.05

□ : factor loadings>0.40

participate because '*planting flowers on the street makes streets look beautiful*' (mean 4.82) and as well provides '*opportunities for communication among local residents*' (mean 4.65). Other frequently chosen motives or benefits of flower-planting, were that participants were '*satisfied after planting flowers*' (mean 4.57) '*attracted to flowers*' (mean 4.52) and that '*participation increases attachment to the neighbourhood*' (mean 4.52) Table 39.



**Figure 12** Attitudes towards street flowers in H. Naebo.

Factor analysis of the items related to motivations in the case of Tokiwa also revealed 3 factors explaining 63.8% of the variance. There were some small differences in the order of the items and the factors. The first factor, accounting for 25.5% of the variance included the same items as in the case of Higashi Naebo except that the item that participation is a *'nice way to spend some free time'* was replaced with the item *'makes the neighbourhood famous'*. The factor was named the same way as in the case of Higashi Naebo - "psychological benefits". The second factor, explaining 22.1% of the variance and named "attachment to the neighbourhood and aesthetic benefits" was in third place in the case of Higashi Naebo. The third factor which explains 16.3% was also named "socially oriented motives".

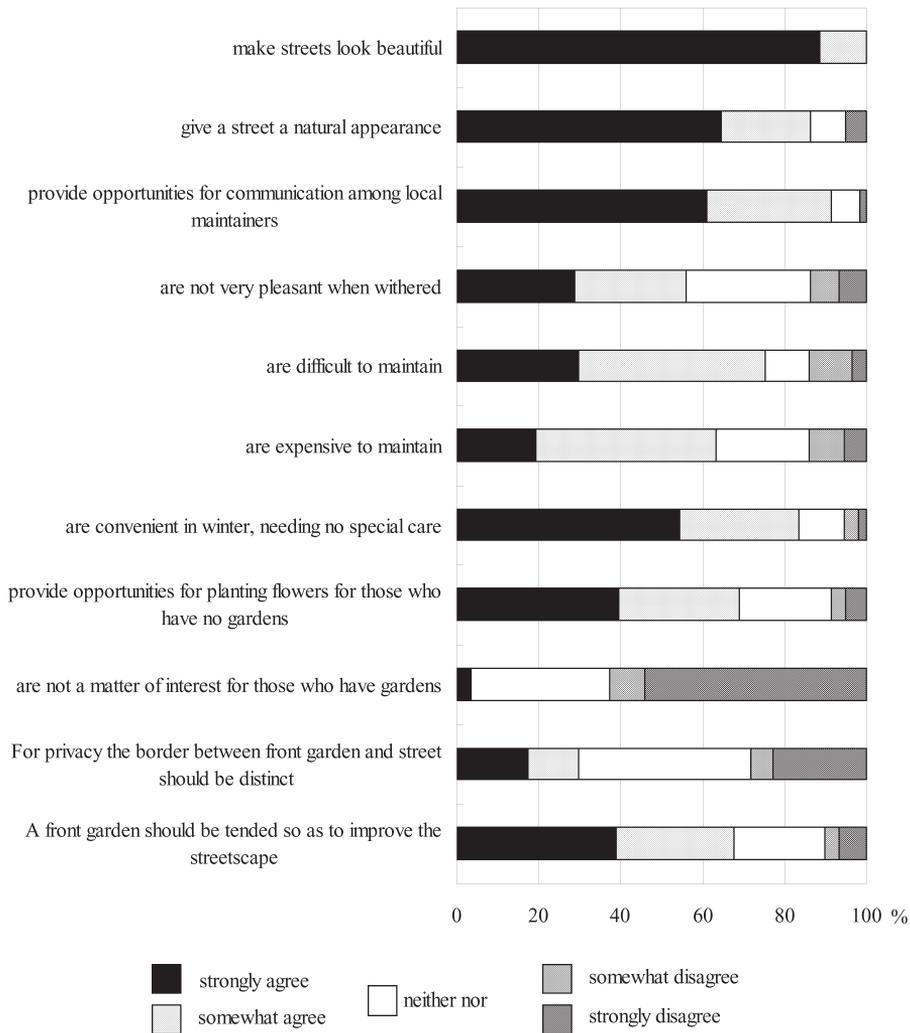


Figure 13 Attitudes towards street flowers in Tokiwa.

### 3). Attitudes to street flowers

The analysis of attitudes to street flowers showed that residents from the two areas shared similar attitudes towards street flowers (Figures 12 and 13). There was a strong agreement that street flowers ‘*make streets look beautiful*’, ‘*give a street a natural appearance*’, ‘*provide opportunities for communication among local residents*’. The respondents as well showed awareness that street flowers are convenient since they need no special care in winter. It should be noted as well that in both areas most of the respondents agreed that ‘front garden should be tended so as to improve the streetscape’.

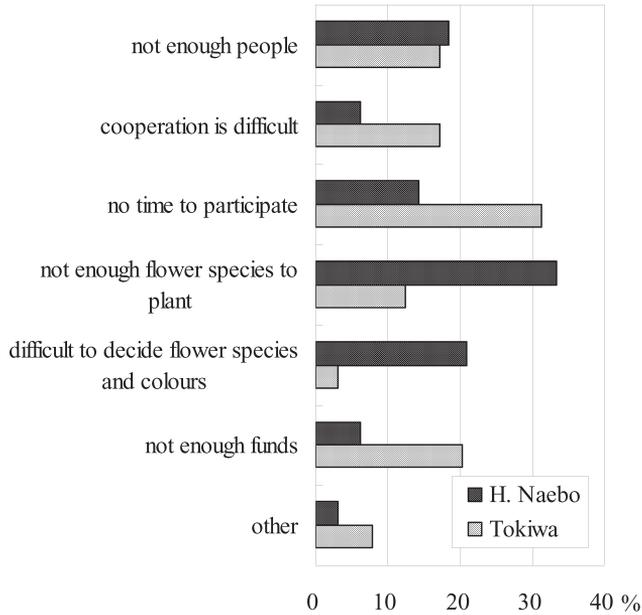


Figure 14 Problems faced by the participants.

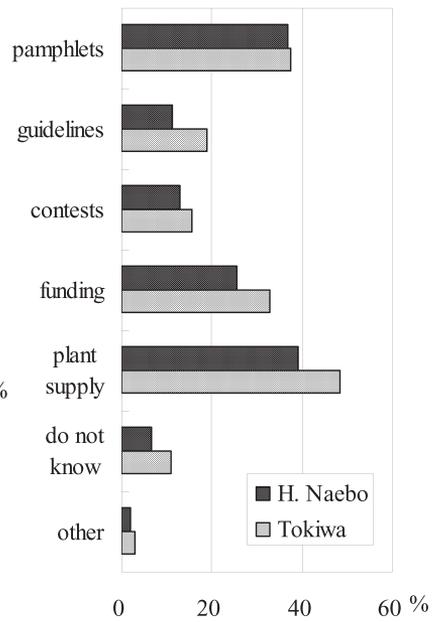


Figure 16 How to easily involve participants.

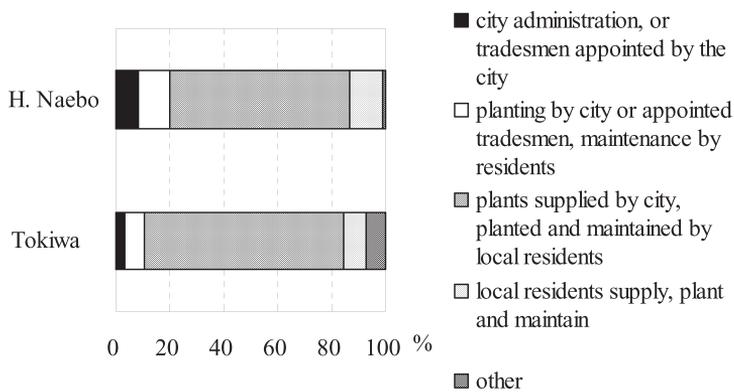


Figure 15 Participants opinion on who should carry out street flower-planting and maintenance.

#### **4). Opinions on issues related to street flower-planting and maintenance**

##### **a). Problems faced**

According to the participants in the area of Higashi Naebo among the available choices of items related to problems faced by the participants, the most frequently chosen one was 'not enough species to plant' (33.3%) followed by 'difficult to decide flower species and colours' (21.0%) and 'not enough people' (18.2) whereas in the area of Tokiwa the most frequently chosen item was 'no time to participate' (31.3%) followed by 'not enough funds' (20.3) and 'not enough people' (17.2) Figure 14.

##### **b). Who should carry out street flower-planting and maintenance.**

'Plants supplied by city, planted and maintained by local residents' was the most frequently chosen option as a proper way of tending flower-planting and maintenance among the both participants from Higashi Naebo - 66.7% and from Tokiwa - 73.7% (Figure 15).

##### **c). How to easily involve participants.**

The respondents from the two areas shared similar opinions on how to involve more participants (Figure 16). 'City providing plant supply' was chosen most frequently (Higashi Naebo - 39.0%; Tokiwa - 48.4%) followed by 'providing pamphlets with announcement and explanation of how to participate and about the benefits of having street flowers' (Higashi Naebo - 36.9%; Tokiwa - 37.5%).

#### **D. Discussion**

Participants from both Higashi Naebo and Tokiwa areas showed similar motives for participation and were mainly motivated to plant flowers because they make the streets look beautiful. This similarity can be explained by the fact that residents participated voluntarily and were attached to their neighbourhoods. Respondents showed an awareness of the aesthetic benefits of flowers and also expressed concern for their neighbourhood. Participants also showed an awareness of the social benefits of planting street flowers as, for example, providing opportunities for communication among local residents through the process of planting.

Participants also shared similar opinions on how to attract more participants and who should be responsible for tending street flowers. Plants supplied by the city administration and a supply of pamphlets informing people how to participate and about the benefits of having street flowers, were seen as proper ways to involve more participants. Similarly, plants supplied by the city, planted and maintained by local residents, was seen as the proper way to tend street flowers. This confirms the results of Chapter V and demonstrates that residents, regardless of their personal involvement in street flower-planting, share similar opinions on issues relating to street flower-planting and maintenance.

Despite the similarities, participants from Tokiwa ranked most items related to motivation significantly higher than participants from Higashi Naebo. This

could be due to the fact that they recently established an organisation and as the majority were members of the organisation, they tended to be more closely involved in street flower-planting issues than participants in Higashi Naebo, who only plant or maintain flowers. Further, activities in Tokiwa are of a smaller scale compared to Higashi Naebo where the planting distance is almost twice as long and over 500 people from several neighbourhoods, go out to plant flowers. On the other hand, in the case of Tokiwa, the organisation concentrates mainly on street flower related issues, whilst in Higashi Naebo the committee is engaged in various activities.

Participants from the two areas also faced different problems, apart from the common issue of not having enough participants. The most frequently pointed-out problem in Higashi Naebo was the lack of variety of flower species to plant, and for respondents from Tokiwa it was the lack of time to participate. These results were not surprising in view of the fact that in Higashi Naebo flower-planting patterns have not been chosen through discussions with participants as in Tokiwa, and that mainly *Petunia sp.* have been supplied to participants, the same species having been repeatedly planted over the past 12 years. In Tokiwa, the available choice of flower species supplied by the Sapporo Development and Construction Department is also limited, but members of the organisation are eager to increase the variety of species. They also sow seeds of other flowers (sunflower seeds) at their own expense and are enthusiastic to experiment with various species of flowers. However, the problems they faced included not having enough time to participate, difficulties in co-operation with the administration and not enough funds. The latter two could be due to the fact that the organisation was only recently established and interaction with the city administration is still weak.

An important finding of this study is that residents in both areas, regardless of their differences, have a similar and strong motivation to plant flowers, e.g. because flowers make streets look beautiful. This fact clearly indicates that city administrators could potentially involve more people in street flower-planting and maintenance, firstly by providing information to arouse their interest, secondly by supplying flower seedlings and funds to those interested, and thirdly by maintaining an effective exchange with those involved. The administrators should also consider the conditions under which residents participate, and then decide what kind of support to provide but not to treat all volunteer organisations equally.

It appears that merely providing flower seedlings to residents might not be the most appropriate way as residents have little choice but to plant only what is supplied to them. Therefore, a suitable option for consideration would be to provide funds instead of seedlings in order to enable residents to choose and buy seedlings of their own choice. If the shortage of flower species appears to be a problem, changing species over the years, and seasons, can serve as one type of

solution.

The results of our study also suggest that consulting those involved in street flower-planting and maintenance is very important and can help them to achieve more satisfying involvement. As Buchecker et al. (2003) pointed out, to foster participation new communicative approaches are needed which allow the exchange of ideas without risking them being discarded.

In conclusion, the activities in both areas worth admiration and could serve as models for other residents interested to become involved in street flower-planting and maintenance. Despite of the different participation conditions and level of motivation, the streets in surveyed neighbourhoods are beautifully decorated with flowers and both participants and street users are satisfied by the nice views of flowers.

In addition, considering the increasing involvement of resident participation in street flower-planting and maintenance and the limitation of species variety, an investigation of species suitable for street-planting is a subject for further research.

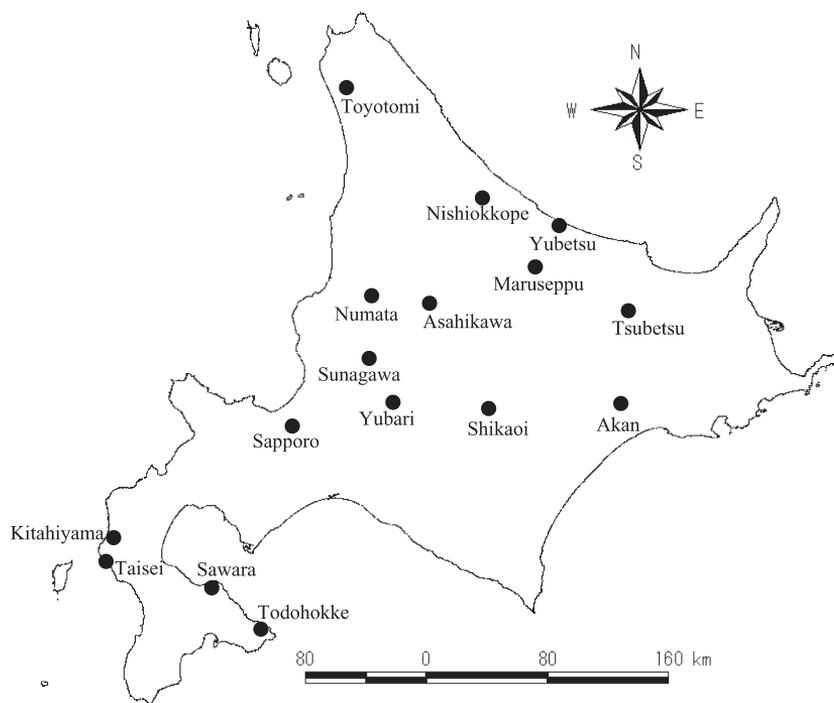
## **Part II: A survey of organisations involved in street flower-planting**

### **A. Introduction and purpose of the study**

The second part of this chapter contains information which has been summarized about 16 volunteer organizations, participating in street flower-planting and maintenance, all located in different cities in Hokkaido and supported by the Hokkaido Bureau for Construction and Development. The subjects of the survey were representatives or those in charge of flower-planting activities carried out on several national roads around Hokkaido. The purpose of the survey was to see what kind of organizations were involved in street flower-planting and maintenance, when and why were they established and what were the problems they had faced. A further aim was to survey opinions on issues related to street flowers. As being representatives or persons in charge of volunteer organizations, involved in street flower-planting, the opinions of these people are valuable and can give some clues to the successful promoting of street flower-planting. Yet another aim of this survey was to collect information about the flower species planted by the volunteers.

### **B. Methodology**

In November 2003, 18 questionnaires, each including a cover letter with explanations, four-paged questionnaire printed on A3, and a self-addressed return envelope were mailed to the representatives or those in charge of street flower-planting and maintenance activities. The surveyed volunteer groups are located in different cities and towns around Hokkaido (Figure 17). They are all supported by the Hokkaido Development Bureau and are listed on the Bureau's home page under The Volunteer Support Program (<http://www.hkd.mlit.go.jp/>)



**Figure 17** Location of the cities and towns where surveys were delivered.

zigyoka/z\_doro/vsp/). The program is related to beautification of national roads sidewalks. Telephone calls were made to all representatives or those in charge of the flower-planting activities, asking them to fill in a questionnaire survey. Out of 20 groups listed, questionnaires were mailed only to eighteen groups. Questionnaires were not mailed to one group which refused to answer the questionnaire and to another one which lacked any experience in street flower-planting since starting this activity from the year 2004. Out of 18 mailed questionnaires, 16 valid answers were received, resulting in a response rate of 89%. All of the surveyed organizations are shown in Table 40 and in order to keep the information authentic, their names are not translated in English.

## C. Results

### 1). Structure and characteristics of the surveyed organisations

Details about the surveyed organizations and responses to many of the questions are included in Table 40. Five of the organizations were established before 1990, five after 1990 and six after 2000. The structure of the organizations varied, some were established as committees, others as neighbourhood unions, others as conference assembly. In 3 out of 15 cases the respondents were representatives of organization and in all the rest were persons in charge of street

**Table 40** Names and characteristics of the surveyed organizations

n	Q1 city or town and name of the organization	Q2 estab- lished	Q6 who took care before	Q4 members			Q5 planting distance	Q13 meetings per year
				men	women	total		
1	Sapporo 芸術の森フラワーロードに花を咲かせる会	2000	neighbourhood union	43	120	163	3.7km	3
2	Nishiokoppe 我が村は美しく事業実行委員会	1996	flowers were not planted	200	100	300	1.5km	1
3	Yubetsu 計呂地自治会	2001	neighbourhood union	80	100	180	1km	1
4	Taisei 宮野町内会	1969	neighbourhood union	NA	NA	126	150m <sup>2</sup>	3
5	Kitahiyama 北檜山町内会連合協議会・フラワー部会	1993	residents living nearby	5	12	17	2.3km	2
6	Toyotomi 花2ネットワーク	1998	other	NA	NA	250	0.85km	4
7	Sawara 砂原町まちづくり運動推進協議会	1992	flowers were not planted	800	1200	2000	8km	3
8	Yubari 紅葉山連合町内会「もみじやまフラワーロード」	2002	neighbourhood union	80	170	250	1km	1
9	Todohokke 楯法華村町内会連合会(7地区の町内会で組織)	1981	women's group	NA	NA	650	0.8km	2
10	Numata 沼田町自治振興協議会	2001	residents living nearby	200	300	500	2km	1
11	Akan 阿寒市街花いっぱい運動推進協議会	1957	flowers were not planted	NA	NA	1300	2.7km	NA
12	Tsubetsu 津別町街並づくり推進会議	1990	residents living nearby	67	100	167	0.7km	4
13	Shikaoi 鹿追町「花と芝生の町づくり」推進協議会	2000	neighbourhood union	NA	NA	804	4.5km	2
14	Asahikawa 旭川南商工会女性部 他4団体	2000	flowers were not planted	30	120	150	2km	5
15	Sunagawa 砂川商店会連合会	1958	administration	292	183	475	2.3km	1
16	Maruseppu 丸瀬布町自治会連合会	1967	various groups	650	750	1400	1.8km	3

Q: question NA: no answer

To see the questionnaire survey refer to Appendix F.

flower-planting facilities. Only one of the surveyed was a female, while all the rest were male. Six of the respondents were in their fifties and five in their 40ies. The age distribution of the other respondents was one person per each age group, and one did not answer. The number of members in the organizations varied from 17 to 2000. Distributed by gender most of the members were women, however in some organizations men were more than women, as in the case of Nishiokoppe, where 200 members were men and 100 were women and in the case of Sunagawa where 292 were men and 183 were women. This shows that, contrary to the common opinion that dealing with flowers is women's work, men

Table 40 continued

Q37	Q8	Q18	Q19	Q31	Q34	Q35	Q42
flower species planted	seedlings per year	stronger attachment	better communication	flower species not enough	need to deepen knowledge	annual species better than perenial	feeling of safety
<i>salvia; petunia; impatiens; tagetes; helianthus; begonia; allyssum; senecio</i>	2	strongly agree	strongly agree	somewhat agree	strongly agree	strongly agree	strongly agree
<i>salvia; tagetes; petunia</i>	2	strongly agree	strongly agree	strongly disagree	strongly agree	neither nor	NA
<i>salvia; tagetes</i>	1	neither nor	somewhat agree	somewhat agree	neither nor	strongly agree	neither nor
<i>tagetes; salvia; lobelia</i>	1	strongly agree	strongly agree	neither nor	somewhat agree	somewhat agree	strongly agree
<i>tagetes; petunia; salvia; begonia; ageratum; impatiens</i>	1	strongly agree	strongly agree	somewhat agree	strongly agree	neither nor	somewhat agree
<i>salvia; petunia; begonia; impatiens; tagetes; viola</i>	1	somewhat agree	strongly agree	neither nor	strongly agree	neither nor	neither nor
<i>tagetes; salvia; lavandula</i>	1	strongly agree	somewhat agree	neither nor	somewhat agree	strongly agree	strongly agree
<i>begonia; salvia; tagetes</i>	1	strongly agree	strongly agree	neither nor	somewhat disagree	strongly agree	strongly agree
<i>begonia; impatiens</i>	1	somewhat agree	somewhat agree	strongly agree	neither nor	somewhat disagree	somewhat agree
<i>salvia; petunia; tagetes</i>	1	strongly agree	strongly agree	somewhat agree	somewhat agree	neither nor	strongly agree
<i>tagetes; salvia</i>	1	strongly agree	strongly agree	strongly disagree	somewhat agree	strongly agree	strongly agree
<i>begonia; tagetes; salvia; ageratum; altermanthera</i>	1	somewhat agree	somewhat agree	strongly agree	somewhat agree	strongly agree	strongly agree
<i>tagetes; salvia; begonia; hemerocallis; cosmos; petunia</i>	2	strongly agree	strongly agree	neither nor	strongly agree	neither nor	strongly agree
<i>origanum</i>	1	strongly agree	strongly agree	neither nor	somewhat agree	strongly disagree	somewhat agree
<i>tagetes</i>	1	strongly agree	somewhat agree	somewhat agree	neither nor	strongly agree	neither nor
<i>tagetes; salvia</i>	1	strongly agree	strongly agree	strongly disagree	somewhat agree	strongly agree	strongly agree

could be equally interested and involved. In seven of the surveyed organizations only members participated in flower-planting and maintenance activities, and in five of the cases people who were not members participated but were not many.

Before the establishment of the organizations, street flower-planting activities have been carried out by the neighbourhood organization unions (in five out of 16 cases), by various groups or by the residents living near by (in 3 cases) or were not carried at all (in 4 cases). Members had meetings twice or more than twice per year in ten out of 15 organizations, and five of the groups had meetings once a year. During the meetings the most frequently discussed issues were

Table 40 continued

Q21	Q26	Q27	Q17	Q43
other areas where flowers are planted	who decides species & design	who should decide species & design	who should tend street flowers	watering method
schools, public facilities	group members	group members	city supplies residents plant	by a car supplied with a water tank
parks' flower beds	administration	professional	city supplies residents plant	NA
parks' flower beds	administration	professional	city plants residents maintain	water pot
schools, public facilities	group members	group members	residents supply plant maintain	by a hose from a nearby water service
parks' flower beds; schools, public facilities	group members	professional	city supplies residents plant	by a hose from a nearby water service
in front of home	group members	group members	city supplies residents plant	other
schools, public facilities; in front of home	group members	group members	city supplies residents plant	other
in front of home	group members	group members	city supplies residents plant	by a hose from a nearby water service
in front of home	professional	group members	city plants residents maintain	by a hose from a nearby water service
other	group members	professional	city supplies residents plant	water pot
schools, public facilities; in front of home	group members	group members	city supplies residents plant	water pot
commercial street	group members	group members	city supplies residents plant	water pot; by a hose from a nearby water service
parks' flower beds; schools, public facilities; in front of home	group members	group members	city supplies residents plant	by car supplied with a water tank
schools, public facilities; near river parks	group members	group members	city supplies residents plant	other
NA	other	other	city supplies residents plant	NA
schools, public facilities	group members	group members	city supplies residents plant	by car supplied with a water tank

related to flower species, design and planting pattern and maintenance. However, other neighbourhood related issues were also discussed. As a means of informing members about events related to flower-planting, most were making use of circulation boards or leaflets. Apart from streets, schools, public institutions, and in front of private homes were most often chosen as additional places where volunteers plant flowers.

The item which was most frequently chosen as a reason for establishing the organization, was “to make the streetscape beautiful.”

Most of the surveyed representatives or those in charge of flower-planting

Table 40 continued

Q38	Q39	Q40	Q9
3 flower species that best fit the streetscape	3 colours that best fit the streetscape	height	level of maintenance
<i>helianthus ; salvia; impatiens</i>	yellow; red; blue	mixed	1-2 times per month
NA	NA	NA	1-2 times per month
NA	red; yellow; pink	low up to 30 cm	1-2 times per month
<i>tagetes; salvia; lobelia</i>	red; yellow; blue	mixed	1-2 times per month
<i>tagetes; salvia; impatiens</i>	red; white; yellow	low up to 30 cm	1-2 times per week
<i>petunia; salvia; viola</i>	yellow; white; pink	low up to 30 cm	other
<i>tagetes; salvia; lavandula</i>	yellow; red; purple	low up to 30 cm	1-2 times per month
<i>tagetes; begonia; salvia</i>	red; yellow; white	low up to 30 cm	other
<i>impatiens; begonia</i>	red; yellow; white	low up to 30 cm	1-2 times per month
<i>tagetes; petunia; salvia</i>	red; yellow; purple	middle 30-100 cm	1-2 times per week
<i>begonia; viola; tagetes</i>	red; orange; yellow	low up to 30 cm	1-2 times per season
<i>begonia; tagetes; salvia</i>	red; white; pink	low up to 30 cm	1-2 times per month
<i>santolina; sedum; helleborus</i>	pink; yellow	NA	1-2 times per month
<i>tagetes</i>	yellow	NA	1-2 times per month
NA	NA	NA	other
<i>tagetes; salvia</i>	red; yellow	mixed	1-2 times per month

activities (13 out of 16 surveyed), thought that there was a need of establishing a network of organizations involved in street flower-planting, in order to exchange ideas, experience and information. Among those who considered that a network is needed, opinions that the leading part should be taken by the Bureau for Construction and Development (6 out of 13) or by the representative of an organization (7 out of 13) were almost equally distributed. Respondents considered “funds” and “seedlings” as the kind of support most needed in regard to flower-planting activities. These two items were chosen with equal frequency. The items “seeds” was not chosen at all.

Among the activities other than planting and maintaining flowers, many of the groups mentioned cleaning the sidewalks, weeding, exhibiting pictures of nicely arranged and maintained flowers at cultural events, illuminations, flower seminars, flower markets, open gardens, spring and autumn cleaning.

## **2). Opinions on issues related to street flower-planting and maintenance**

### **a). Problems faced**

According to the opinions of those in charge of organisations involved in street flower-planting and maintenance, the problem most frequently faced was “watering of the flowers”, followed by “not enough people to maintain” the flowers. Other items chosen as problems were “not enough time to participate” and “not enough funds”. There were various methods of watering used by the volunteer groups. Flowers were watered either by a hose using water from the nearby water service, or by common watering pots, or by a car supplied with a big water tank. In one of the cases the watering was carried out by the road maintaining service.

### **b). Who should tend street flower-planting and maintenance and how to easily involve participants.**

The majority of the respondents (13 out of 16 cases) chose “plants supplied by the city, planted and maintained by local residents” as a proper way of tending street flowers.

Many of the surveyed gave free answers related to how to involve participants. However their suggestions can hardly be summarized into a general conclusion since most comments were related to what they would like to achieve, as for example to involve more young people or more male participants, than to what should be done to achieve this. Besides the free answers however, the most frequently chosen option as a way of involving more participants, was “the use of pamphlets with announcements and explanations of how to participate and about the benefits of street flowers”.

## **3). Issues related to flower species**

### **a). Flower species planted**

Only one volunteer organization - “Making the flowers bloom on the Art park flower road”, situated in Sapporo, sowed seeds in addition to planting seedlings, whereas the remaining 15 only planted seedlings. Thirteen out of the 16 surveyed groups planted seedlings once a year and three of the groups, including the “Making the flowers bloom on the Art park flower road” planted seedlings twice a year.

Of the species planted by the volunteers, *Tagetes sp.* and *Salvia sp.* were mentioned equally often. These species prove to be the most often used for planting on streets in various areas of Hokkaido. These are also the species, which are most often supplied by the administration, in this case by the Hokkaido

Bureau for Development. Other frequently used species were from the genera *Begonia*, *Petunia* and *Impatiens*. Occasionally were planted also species from the genera *Viola*, *Ageratum*, *Senecio*, *Origanum*, *Lavandula*, *Lobelia*, *Hemerocallis*, *Cosmos*, *Helianthus* and *Alyssum*. In most of the cases volunteers were planting at least two species, however, one of the groups planted only one species (*Origanum sp.*).

#### **b). Appropriate flower colours, height and species**

The representatives or those in charge of flower-planting activities were asked to write down three flower species which they consider as most appropriate to streetscapes. The most frequently mentioned were again *Tagetes sp.* and *Salvia sp.*, followed by *Begonia sp.* and *Impatiens sp.*

As for the colours, yellow and red were most often chosen, followed by white, pink, purple, blue and orange. However the most appropriate colours chosen correspond to the colours of species most frequently planted.

Regarding the height of the flowers suitable for street plantings, 50% of the surveyed chose low (less than 30 cm) and 19% chose a combination of low and middle height flowers. Eleven out of the 16 surveyed considered that flower species and colours should be unified on each street.

Twelve out of the 16 surveyed, stated that at present the group members themselves were deciding the flower species and the design pattern. In their opinion, the issues related to flower species and design pattern should be considered by the members of the groups than by administration or professionals. They claimed that this way is more pleasant.

#### **4). Free comments**

Many of the representatives or those in charge of an organization shared their comments regarding street flower-planting activities. There was an opinion that the view of flowers blooming along streets calm down the passers-by. However in many places around Hokkaido, including Sapporo, there are the same species of flowers planted which is probably due to their resilience and easiness to maintain. In this regard, the members of one of the volunteer groups were eager to experiment with different species so that to give originality to their neighbourhood. Other representatives shared their need of taking measures to involve more people of different ages but not only the always participating elementary or junior high school and advanced-aged people. Another opinion was that several years have passed since flower-planting activities have begun, every year the participants have been discovering new things or new issues have been occurring, thus making them learn all the time. Regardless of the efforts and difficulties, they were all satisfied by watching the blooming flowers. Yet another opinion was that even though flower-planting is considered to be women's work, there is heavy labor involved in such activities and the involvement of more male participants should be considered. Another respondent expressed the

opinion that through the process of flower-planting, better communication between people living in different areas has been achieved.

#### **D. Discussion**

One aim of the survey concerned in this part was to summarise information about groups involved in street flower-planting and supported by the Hokkaido Development Bureau. The survey showed that the organizations differed in terms of structure, establishment, continuance, and number of members, however they were all established with the intent to beautify the streetscapes in their neighbourhoods. The results also suggest the importance of strong partnership between volunteers and administration.

Flowers of the genera *Tagetes* and *Salvia* were most often planted, but some of the groups were eager to experiment with different species. In order to prevent monotony and similar streetscapes all over Hokkaido, the use of other suitable species to plant on streets should be considered. In this regard, the relevant administration which usually supplies flower seedlings to the volunteer groups could help in this issue by supplying different flower species to different groups, and through discussions with representatives. Therefore there is a necessity of establishing a network of organizations involved in the beautification of national roads, which was as well suggested and by most of the surveyed.

Considering the aforementioned, it can be assumed that the administration's role in promoting street flower-planting is still very important. At this stage the administration's support, in terms of providing funds and plants, is needed by residents as they do not yet seem willing to engage in street flower-planting independently, without any participation from the city administration. Therefore, a connecting structure (committee, organisation or union) between participants and administration is necessary. At present there are various kinds of connecting structures (organisations, committees, unions, associations) involved in street flower-planting and maintenance over Hokkaido, supported by different authorities. It can be suggested that for a better inter-relation and exchange of ideas and experience among volunteers, an establishment of a network connecting all different kind of groups involved in street flower-planting and maintenance should be considered.

As problems were mentioned the watering and not enough people involved in the maintenance of the flowers. Participating in flower-planting is easier since it is once or twice a season, however maintenance requires repeated efforts. This problem suggests the importance of the properly selected species in regard to their maintenance. The less effort they require for the maintenance the better.

According to the opinion of those surveyed, yellow or red were the flower colours that best fit the streetscape and in regard to height, the majority considered low flowers as better fitting the streetscape. These results are consistent with the findings in Chapter II, where preferences for street flowers were discus-

sed. However, the species *Tagetes sp.* and *Salvia sp.* which were most often used might have influenced preferences for colours and height. These species are characterised with long flowering periods and are relatively easy to maintain which is probably the reason for their frequent use. They are also most often supplied to the volunteer groups by the Hokkaido Development Bureau. However, using the same species over a long period of time and at many places could lead to a monotony. As noted above some of the representative have already become aware of this fact and have made attempts to use other species in order to bring originality to the streets in their neighbourhoods.

The results from this survey also show the need of research concentrated on investigating species of flowers suitable for streetscapes.

## **VII. Conclusions**

### **A. The benefits of having flowers on the streets**

This research focused on the benefits of having flowers along streets and on the benefits of resident involvement in street flower-planting. As noted earlier, studies on street flowers have been rare worldwide and, such investigation was undertaken for the first time in Hokkaido. It was demonstrated that planting flowers on streets not only contributes to the beautification of urban areas but has many others important benefits, including psychological, social, neighbourhood oriented, educational and health related. The presence of flowers on the streets makes people feel more relaxed and safer from traffic. On the other hand, the involvement in flower-planting activities can contribute to the strengthening of communication among local residents and to building a partnership between citizens and administration which can be useful for the solution of various problems.

It is also worth noting that many elementary or junior high school students are involved in flower-planting activities in Japan. This is very educational, because by growing flowers children can learn to be responsible, respect and preserve nature, and be beneficial to their neighbourhoods.

The results from this study pointed out the psychological benefits of having street flowers, thus adding to the literature devoted to the benefits of viewing vegetation (Ulrich, 1984; Ulrich and Parsons, 1992). Those involved in flower-planting activities stated they felt satisfied after planting flowers and many passers-by, pedestrians or drivers seem to be calmed down by the views of flowers.

The analysis of attitudes towards street flowers showed that in general, flowers were appreciated for their aesthetic contribution however those surveyed were also aware of some other benefits flowers can provide to people, such as better communication among local residents. It is encouraging that the surveyed residents of Sapporo were relatively eager to participate in street flower-planting

and maintenance. Divided on the basis of their attitudes towards street flowers there were three groups of people – such who had negative attitudes, such who were socially oriented and such who were aesthetically motivated. The first group contained the least number of people, and the third group was represented by the largest number of people.

### **B. Preferences for street-planting models and cultural differences**

The results from this study also add to the literature investigating preferences for street-planting models (Fujiwara and Tashiro, 1984; Masuda et al., 1989; Abe et al., 1990) showing once again that a combined type of street vegetation is more favoured than only single trees planted and that it matters what is planted under the trees. According to the findings related to preferences for street flower-planting models discussed in Chapter III, flowers were most preferred by the Japanese respondents, out of a choice including also soil, grass and hedge. In particular, low and bright flower were preferred and presence of trees was the strongest factor influencing preferences. It should also be noted that long types of flower beds were more preferred than short ones and therefore the increase of such street flower beds should be considered. However, as discussed in Chapter IV, cultural differences between Japanese and Bulgarian respondents were found in regard to preferences for street-planting models. Shrubs or hedges, as well as tall flowers were evaluated higher by the Bulgarian respondents. This shows that preferences for street-planting models can not be unified and demonstrated the influence of upbringing and cultural environment. However, even though there were some cultural differences the results clearly show the importance of trees to the streetscape as well as the arrangement of the space beneath trees.

### **C. The benefits of citizens involvement in street flower-planning and maintenance**

The results of this study showed an example of how highly motivated and consciousness Japanese citizens could contribute to the beautification of their neighbourhoods and thus of their cities and towns, in partnership with the relevant administration. Through the direct involvement in planting flowers on the streets, citizens can become more attached to and responsible for their neighbourhoods. Therefore, city administration should direct resources towards involving local residents in street beautification, rather than appointing companies to do this.

Those who were directly involved in the process of planting flowers on the streets were mostly motivated to make streets in their neighbourhoods beautiful. Regardless of the structure of the volunteer group, participation pattern, continuance, and support provider, people were equally motivated to make their neighbourhoods beautiful by the means of planting flowers on the street. The survey of the representatives of volunteer organizations or those in charge of flower-

planting activities also showed that such volunteer groups were mainly established to beautify their townscapes.

The results revealed consistent opinions on who should tend street flowers, i.e. plants supplied by the administration, flowers planted and maintained by residents. This as well shows the willingness of residents to get involved in the beautification of their neighbourhoods.

In short, citizen involvement in flower-planting on streets is beneficial firstly to the citizens in the way that it provides them with a beautiful neighbourhood and helps them strengthen local ties and secondly to the administration, in the way that it saves effort and funds, and thirdly to the users of the street – pedestrians or drivers, by providing them nice views that can make them feel more relaxed.

#### **D. Suggestions for future promotion of street flower-planting involving citizens**

The findings of this study could serve as a guide for administrations and volunteer organizations, not only in Japan but also in other countries, interested to involve citizens in activities related to streetscape beautification. In many countries the importance of the role of citizens in town planning and beautification has increased. However the level of citizens involvement also highly depends on the awareness of the citizens. The results from this study could give some suggestions to administrations and authorities supporting volunteer organizations involved in street flower-planting and maintenance. For successful involvement of citizens, the plants supply seems to be the most important issue but is not the only one. To encourage participants and achieve an effective partnership, the supporting administration should not only supply flowers to the participants but regularly consult them, be aware of, and help in solving of occurring problems.

At present many of the involved volunteers are eager to choose the flowers species and the design pattern themselves. Therefore volunteers should be given more choices in regard to flower species. More information regarding street flowers issues is also needed. Pamphlets should be provided to the volunteers with information about suitable flower species, design patterns, contests, problems which can be faced and how to avoid such problems, and also various ideas on how to make citizen participation more effective and enjoyable. Such pamphlets should be created by the relevant administration or by the representatives of volunteer groups and those in charge of flower-planting activities since they have the experience and the information needed. The advice of professionals should also be considered. Therefore the establishment of a network of volunteer organizations involved in street flower-planting should be considered as an appropriate way of exchanging information and experience between the groups. By communication and exchange of ideas, such groups can achieve even more in

terms of contribution to the beautification of their neighbourhoods. This could be the way for a significant involvement of citizens in town beautification issues. On the other hand, there is a kind of contagiousness and new groups can be easily established influenced by the activities of their neighbours. Such new groups should be encouraged and guidance should be provided for their quick orientation and development. This also suggests the establishment of a network of organisations involved in street flower-planting which should welcome and support beginners.

It can be assumed that the administration's role in promoting street flower-planting is still very important. At this stage the administration's support, in terms of providing funds and plants, is needed by residents as they do not yet seem willing to engage in street flower-planting independently, without any participation from the city administration. Therefore, a connecting structure (committee, organisation or union) between participants and administration is necessary. There are various kinds of connecting structures (organisations, committees, unions, associations) involved in street flower-planting and maintenance over Hokkaido, supported by different authorities. It can be suggested that for a better inter-relation and exchange of ideas and experience among volunteers, an establishment of a network connecting all different kind of groups involved in street flower-planting and maintenance should be considered.

At present it seems that residents and administration are cooperating well, however residents highly depend on the administration as a flower seedling supplier. However, what would happen if due to fund limitations the administration can not supply flower seedlings anymore. Would then the volunteers be eager to grow flowers from seeds or buy the flower seedlings themselves? The results from the surveys in this study showed that most of the respondents considered city administration supplying plants and residents planting and maintaining to be a proper way of tending street flowers. Therefore it could be assumed that deprived of plant supply many of the participants will probably give up the present activities if they are not enough motivated to continue. However, growing flowers from seeds can be too hard for residents since it requires space, additional efforts and is time-consuming compared to planting of seedlings. In this regard an exchange among various organizations should also be considered because it could also help to increase the diversity of species.

In regard to maintenance, the use of low-maintenance species should be increased, since many volunteer organizations seem to experience a shortage of people maintaining the flowers. The use of ground covers along with the annual flowers should also be suggested.

At present many people plant whatever they want in the street flower beds situated in front of their homes and some citizens even grow vegetables. In this regard the establishment of regulations related to the use of street flower beds should also be considered.

By undergoing this research it has become clear that the same species of flowers are repeatedly used in many places and probably many of the people involved in street flower-planting would be eager to use other species, to create original neighbourhoods. Changing species through the years or increasing the number of species appropriate for street-planting can prevent the occurrence of monotonous flower beds. Therefore the results from this study give some perspectives for further research focused on flower species suitable to plant along the streets with respect to their aesthetic, ecological, biological and other characteristics.

### **Acknowledgements**

I would like to express my deep gratitude to Professor Shoichiro Asakawa for accepting me in the Laboratory of Environmental Horticulture and Landscape Architecture, Hokkaido University and for his continuous supervision. I would also like to express my sincere gratitude to Professor Katsuji Oosawa, Laboratory of Horticultural Science, for his encouragement and for reading the manuscript. I am grateful to Associate Professor Tetsuya Kondo for his helpful discussions and valuable suggestions upon reading the manuscript. I am indebted to Assistant Professors Tetsuya Aikoh and Hajime Matsushima for their inspiring guidance, encouragement and support. I appreciate the continuous help and useful advice of Dr. Minoru Okada and Ph.D. student Shuowen Tseng.

I am indebted to Ms. Chiharu Shiraishi, Secretary, Laboratory of Environmental Horticulture and Landscape Architecture, for her kind assistance and help in various issues which made my living in Japan easier and enjoyable. Many thanks are due to all of the students in the Laboratory of Environmental Horticulture and Landscape Architecture, for their patience to teach me Japanese and for introducing me to various aspects of Japanese life and culture.

I would like to acknowledge the assistance of Mrs. Youko Ootani, representative of the “Geijitsu no Mori Furawa Rodo ni Hana wo Sakaseru Kai” (Making the flowers bloom on the Art park flower road) and Mr. Hiroshi Sasaki, head of the office of the “Moere Machi Tsukuri Committee” and thank them for sharing useful information as well as for their help in carrying out the surveys discussed in Chapter VI, Part I.

Finally I am grateful to Monbukagakusho (The Japanese Ministry of Education, Culture, Sports, Science and Technology) for offering a scholarship that enabled me to live and research in Japan.

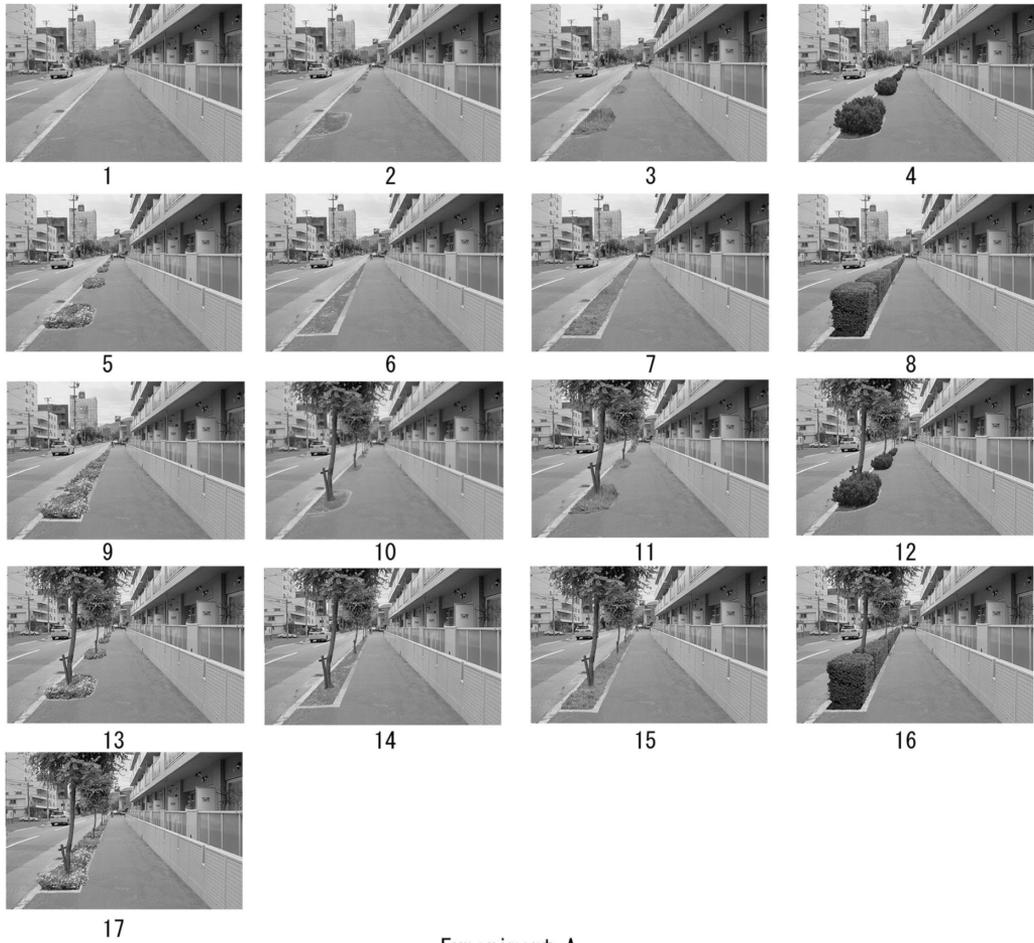
### References

- 1) Abe, D., Masuda, N., Shimomura, Y., 1990. Study on the landscape planting models of the street using the photomontage method. *Journal of the Japanese Institute of Landscape Architects* 53 (5) 245-250. (In Japanese with English summary).
- 2) Abello, R.P., Bernaldez, F.G., 1986. Landscape preference and personality. *Landscape and Urban Planning*, 13, 19-28.
- 3) Akbar, K.F., Hale, W.H.G. and Headley, A.D. (2003) Assessment of scenic beauty of the roadside vegetation in northern England. *Landscape and Urban Planning*, 63, 139-144
- 4) Anderson, L.M., Cordell, H.K., 1988. Influence of trees on residential property values in Athens, Georgia (U.S.A.): a survey based on actual sales prices. *Landscape and Urban Planning*, 15, 153-164.
- 5) Antupit, S., Gray, B., Woods, S., 1996. Steps ahead: making street that work in Seattle, Washington. *Landscape and Urban Planning*, 35, 107-122.
- 6) Attractive North Community Planning, 2003. Hokkaido Construction Bureau, Promotion of Community Planning Section
- 7) Brush, R., Chenoweth, R.E., Barman, T., 2000. Group differences in the enjoyability of driving through rural landscapes. *Landscape and Urban Planning*, 47, 39-45.
- 8) Buchecker, M., Hunziker, M. and Kienast, F. (2003) Participatory landscape development: overcoming social barriers to public involvement. *Landscape and Urban Planning*, 64, 29-46
- 9) Buhyoff, G.J., Wellman, J.D., 1983. Landscape preference metrics: An international comparison. *Journal of Environmental Management*, 16, 181-190.
- 10) Buhyoff, G.J., Wellman, J.D., Harvey, H., Fraser, A., 1978. Landscape architects' interpretations of peoples landscape preferences. *Journal of Environmental Management*, 6, 255-262.
- 11) Butterfield, B., Relf, D., 1992. National survey of attitudes towards plants and gardening. The role of horticulture in human well-being and social development. A national symposium (proceedings). Timber Press, Portland, Oregon, pp. 211-212.
- 12) Crewe, K., (2001) "The quality of participatory design: The effects of citizen input on the design of the Boston Southwest corridor", *APA Journal* 67 (4) 437-455.
- 13) Ellis L., Ficek Ch., 2001. Color preferences according to gender and sexual orientation. *Personality and Individual Differences*, 31 (8) 1375-1379.
- 14) Flower master newsletter (1999) Hokkaido Construction Bureau, Promotion of City Planning Office, City Planning Section. 18 pp. (in Japanese)
- 15) Forum of the Road Repair Cases from the North (2000) Hokkaido road management engineering center. 45 pp. (in Japanese)
- 16) Frumkin, H., 2001. Beyond toxicity: Human health and the natural environment. *American Journal of Preventive Medicine*, Vol. 20, 3, 234-240.
- 17) Fujiwara, N. and Tashiro, Y., (1984) "A study on desirable form of roadside planting", *Journal of the Japanese Institute of Landscape Architects* 47 (5) 263-268. (In Japanese with English summary)
- 18) Gibbons, J., Oberholzer, B. 1992. Urban streetscape/A workbook for designers, Van Nostrand Reinhold, New York, pp. 68-76.
- 19) Hayashi, M. (2000) "Sustainable NPO activities after the great Hanshin Awaji earthquake with the citizens participation", *Proceedings of the 10<sup>th</sup> IFLA Eastern Regional Conference*, 266-272.

- 20) Hirata, F. (2000) The curriculum of “The leader’s training course in community works with flowers & greenery” and participants’ achievement in new awareness. *Proceedings from the 10<sup>th</sup> IFLA Eastern Regional Conference*, 273–280
- 21) Hitchmough, J.D. and Bonugli, A.M. (1997) “Attitudes of residents of a medium sized town in South West Scotland to street trees”, *Landscape Research*, 22 (3) 327–337.
- 22) Hokkaido Development Bureau, 2002, Volunteer Support Program, Home page.
- 23) [http://www.hkd.mlit.go.jp/ziyoka/z\\_doro/vsp/](http://www.hkd.mlit.go.jp/ziyoka/z_doro/vsp/)
- 24) Honeyman, M.K., 1992. Vegetation and stress: a comparison study of varying amounts of vegetation in countryside and urban scenes. The role of horticulture in human well-being and social development. A national symposium (proceedings). Timber Press, Portland, Oregon, pp. 143–145.
- 25) Hudspeth, T. R. (1986) “Visual preference as a tool for facilitating citizen participation in urban waterfront revitalisation”, *Journal of Environmental Management*, 23, 373–385
- 26) Ichihashi, H., Watanabe, R. and Kojima, M., (2000) “Mental effects of street planting on pedestrians and drivers”, *Journal of the Japanese Institute of Landscape Architecture* 63 (5) 795–798. (In Japanese with English summary)
- 27) Iwamura, T. and Yokohari, M. (2001) Review and future perspectives of park maintenance and management by local communities in Kobe city, Hyogo Prefecture. *Journal of the Japanese Institute of Landscape Architecture* 64 (5) 671–674. (In Japanese with English summary)
- 28) Jacobs, A., 1997. Keynote: Looking, Learning, Making. Places, 11(2) 3–7.
- 29) Jones, S. 1999 Participation and community at the landscape scale. *Landscape Journal* 18 (1) 65–78
- 30) Jorgensen, A., Hitchmough, J. and Calvert, T. (2002) Woodland spaces and edges: their impact on perception of safety and preference. *Landscape and Urban Planning*, 60, 135–150
- 31) Kaltenborn, B., Bjerke, T., 2002. Associations between environmental value orientations and landscape preference. *Landscape and Urban Planning*, 59, 1–11.
- 32) Kaplan, R., 1992. The psychological benefits of nearby nature. The role of horticulture in human well-being and social development. A national symposium (proceedings). Timber Press, Portland, Oregon, pp. 125–133.
- 33) Kaplan, R., Herbert, E., 1987. Cultural and sub-cultural comparisons in preferences for natural settings. *Landscape and Urban Planning*, 14, 281–293.
- 34) Kaplan, R., Talbot, J.F., 1988. Ethnicity and preference for natural settings: a review and recent findings. *Landscape and Urban Planning*, 15, 107–117.
- 35) Kaplan, S. and Kaplan, R. (1989) The visual environment: Public participation in design and planning. *Journal of Social Issues*, 45 (1) 59–86
- 36) Kawane, A., Aikoh, T. and Asakawa, S. (2000) “Attitudes of the residents toward private gardening in Megumino, Hokkaido”, *Journal of the Japanese Institute of Landscape Architecture* 63 (5) 695–700. (In Japanese with English summary)
- 37) Kent, R.L., 1993. Attributes, features and reasons for enjoyment of scenic routes: a comparison of experts, residents, and citizens. *Landscape Research*. 18 (2) 92–102.
- 38) Kuo, F.E., 2003. The role of arboriculture in a healthy social ecology. *Journal of Arboriculture*, 29 (3) 148–155.
- 39) Let’s start! Flower and Greenery Community Planning, 2000. City Afforestation Fund, 138pp.
- 40) Macia, A., 1979. Visual perception of landscape: sex and personality differences. Our

- National Landscape, USDA Forest Service General Technical Report PSW- 35. Berkeley, California: Pacific Southwest Forest and Range Experiment Station, pp. 279-285
- 41) Manns, S. and Wood, C. 2002. Allowing the public to have its say at planning committee – towards good practice. *Town & Country Planning*, September, 226-228
  - 42) Masuda, N., Shimomura, Y. and Abe, D., 1989. Study on the street greenery to bring about the urban landscape development”, *Journal of the Japanese Institute of Landscape Architects* 52 (5) 318-323. (In Japanese with English summary)
  - 43) Matsumura, M. 1996. Research concerning community involvement in the project of traffic improvement. *International Association of Traffic and Safety Sciences*, 22 (2) 40-48 (in Japanese with English abstract)
  - 44) McPherson E. G. and Johnson, C.W. 1988. A community forestry planning process: case study of citizen participation. *Landscape and Urban Planning*, 15, 185-194
  - 45) Naganuma, M. and Kamihogi A., 2003. A study of flower-planting by people along a road and their awareness of it in Kobe City, Western Japan. *Journal of the Japanese Institute of Landscape Architects* 66 (5) 819-824. (In Japanese with English summary)
  - 46) Neuberger, K., 1992. Horticultural therapy in a psychiatric hospital: picking the fruit. The role of horticulture in human well-being and social development. A national symposium (proceedings). Timber Press, Portland, Oregon, pp. 185-188.
  - 47) O-bay 2003. Osaka bay public information magazine, 15, Spring.
  - 48) Parsons, R., Tassinary, L.G., Ulrich, R.S., Hebl, M.R., Grossman-Alexander, M., 1998. The view from the road: implications for stress recovery and immunization. *Journal of Environmental Psychology*, 18, 113-139.
  - 49) Peterson, G.L., 1967. A model of preference: quantitative analysis of the perception of the visual appearance of residential neighbourhoods. *Journal of Regional Science*. 7(1) 19-31.
  - 50) Pinfield, G., 2000. Local participation in modern local government. *Town & Country Planning*, May, 156-157
  - 51) Radley, S., 1997. Healthcare guidance. *Landscape Design* 2, 19-21.
  - 52) Relf, D., 1992. Human issues in horticulture. *HortTechnology*, 2(2) 159-171.
  - 53) Satsunae’s plan for the promotion of greenery pamphlet (1998) Moere city planning committee. Sapporo city, Environmental bureau, Department for promotion of greenery. (in Japanese)
  - 54) Sapporo city 1990, Ordinance promoting greenery in Sapporo city
  - 55) Schroeder, H.W. 1986 Psychological value of urban trees: Measurement, meaning and imagination. Proceedings of the Third National Urban Forestry Conference. American Forestry Association, Washington, D.C., pp. 55-60
  - 56) Schroeder, H.W., 1983. Variation in the perception of urban forest recreation sites. *Leisure Sciences*, 5(3) 221-230
  - 57) Schroeder, H.W., Cannon, W.N.Jr., 1983. The esthetic contribution of trees to residential streets in Ohio towns. *Journal of Arboriculture*, 9(9) 237-243.
  - 58) Schroeder, H., Cannon, W. 1987. Visual quality of residential streets: both street and yard trees make a difference, *Journal of Arboriculture*, 13(10) 236-239.
  - 59) Shimomura, Y., 1994. Fundamental study on the consolidation of pedestrian space on the city streets. Osaka Prefecture University Bulletin, Series B (46) 195-235. (In Japanese with English summary).
  - 60) Shinkawa cosmos road pamphlet (1998) Hachiken chuo neighbourhood association union. Sapporo city west ward. (in Japanese)

- 61) Smardon, R., (1988) Perception and aesthetics of the urban environment: review of the role of vegetation. *Landscape and Urban Planning*, 15, 85-106
- 62) Sommer, R., Guenther, H. and Barker, Ph. A. (1990) Surveying householder response to street trees. *Landscape Journal*. 9, 79-85
- 63) Sommer, R., Guenther, H. and Cecchetti, Ch. L. (1992). A user-based method for rating street trees. *Landscape Research*. 17(3) 100-107
- 64) Stoneham, J., 1997. Health benefits. *Landscape Design* 2, 23-26.
- 65) Talbot, J.F., Kaplan, R., 1984. Needs and fears: the response to trees and nature in the inner city. *Journal of Arboriculture*, 10 (8) 222-228.
- 66) Taylor, M. (2000) Neighbourhood management - planning for real?. *Town & Country Planning*, May, 172-173
- 67) Tips, W.E.J., Savasdisara, T., 1986a. Landscape preference evaluation and sociocultural background: a comparison among Asian countries. *Journal of Environmental Management*, 22, 113-124.
- 68) Tips, W.E.J., Savasdisara, T., 1986b. The influence of the environmental background of subjects on their landscape preference evaluation. *Landscape and Urban Planning*, 13, 125-133.
- 69) Tips, W.E.J., Savasdisara, T., 1986c. The influence of the socio-economic background of subjects on their landscape preference evaluation. *Landscape and Urban Planning*, 13, 225-230.
- 70) Ulrich, R. S., 1974. Scenery and the shopping trip: The roadside environment as a factor in route choice. Michigan Geographical Publication No. 12, Department of Geography, University of Michigan, Ann Arbor, 176 pp.
- 71) Ulrich, R.S., 1984. View through a window may influence recovery from surgery. *Science*, 224, 420-421.
- 72) Ulrich, R. S., 1986. Human responses to vegetation and landscapes. *Landscape and Urban Planning*, 13, 29-44.
- 73) Ulrich, R.S. and Parsons, R. (1992) Influences of passive experiences with plants on individual well-being and health. The role of horticulture in human well-being and social development. A national symposium (proceedings). Timber Press, Portland, Oregon, pp. 93-105
- 74) Van den Berg, A.E., Vlek, C.A.J., Coeterier, J.F., 1998. Group differences in the aesthetic evaluation of nature development plans: a multilevel approach. *Journal of Environmental Psychology*. 18, 141-157.
- 75) Wellman, J.D., Buyhoff, G.J., 1980. Effects of regional familiarity on landscape preferences. *Journal of Environmental Management*, 11, 105-110.
- 76) Wolf, K., 2003. Freeway roadside management: the urban forest beyond the white line. *Journal of Arboriculture*, 29(3) 127-135.
- 77) Yang, B., Kaplan, R., 1990. The perception of Landscape Style: a Cross-cultural Comparison. *Landscape and Urban Planning*, 19, 251-262.
- 78) Yu, K., 1995. Cultural variations in landscape preference: comparisons among Chinese sub-group and Western design experts. *Landscape and Urban Planning*, 32, 107-126.
- 79) Zmyslony, J. and Gagnon, D., 1998. Residential management of urban front-yard landscape: A random process?. *Landscape and Urban Planning*, 40, 295-307.

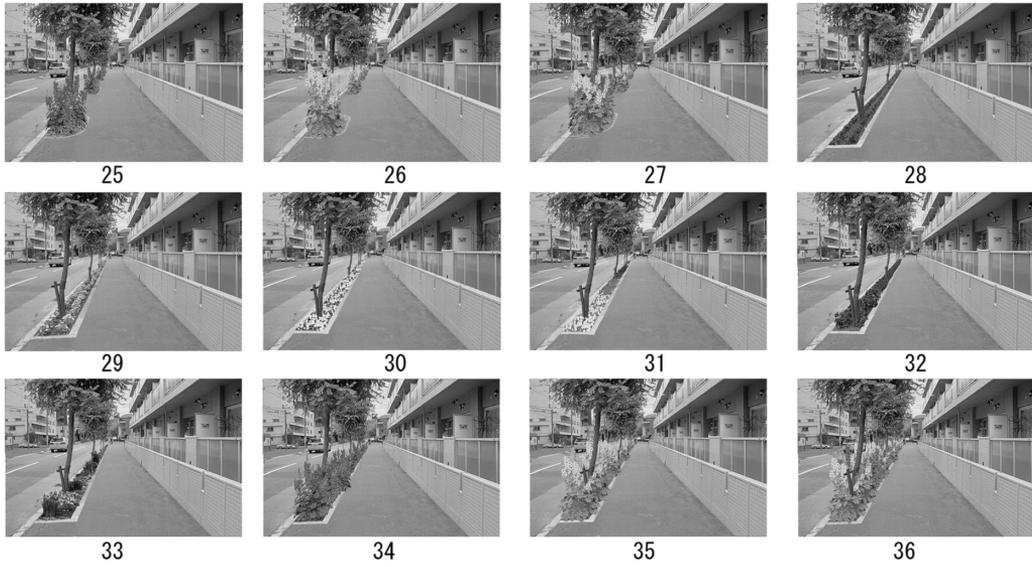


Experiment A

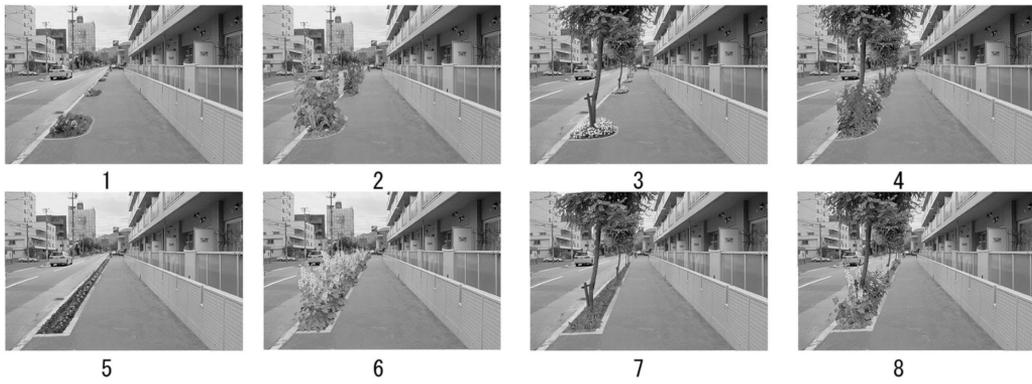
Appendix A -Photomontage simulations used in the evaluation of street-planting models



Experiment B



Experiment B



Experiment C