



**APPLIED RESEARCH IN THE ASPECTS OF LANDSCAPE
OPTIMIZATION AND ORNAMENTAL PLANTS ACCLIMATIZATION
AT THE FACULTY OF LANDSCAPING OF KAUNAS COLLEGE**
*KAUNO KOLEGIJOS KRAŠTOTVARKOS FAKULTETE VYKDOMI
TAIKOMIEJI TYRIMAI DEKORATYVIŲJŲ AUGALŲ INTRODUKCIJOS IR
AKLIMATIZACIJOS ASPEKTU*

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Abstract. *Urbanizuota aplinka, jos fizinių komponentų kokybė šiuolaikinei visuomenei yra ypač svarbi, nes vis daugiau gyventojų telkiasi miestuose. Ji, be plataus spektro ekologinių reiškinių, veikia ir visuomenę. Beatodairiškas gamtinės aplinkos urbanizavimas, intensyvus naudojimas ir tarša yra viena pagrindinių šiandienos problemų. Miestų žaliųjų plotų sistemų kūrimas, svarbus tiek urbanizuotos aplinkos optimizavimo, tiek gamtos vertybių išsaugojimo urbanizuotoje aplinkoje aspektu. Urbanizacijos procesai agresyviai skverbiasi į miestų skverus, parkus, gėlynus, todėl svarbus tampa konteinerinis želdinimas. Jam naudojami vienmečiai, daugiamečiai lauko ir kambariniai (vazoniniai) augalai.*

Straipsnyje nagrinėjami Kauno Kolegijos, kraštotvarkos fakultete Želdinių ir agrotechnologijų katedroje 2004 - 2008 metais atlikti taikomieji moksliniai tyrimai: „Dekoratyviųjų ir sodo augalų sortimento, technologijų ir aplinkos optimizavimas“. Introdukcijos ir aklimatizacijos aspektu nagrinėtos šios temos: „Lauko gėlių sortimento ir išplitimo kaitos analizė Lietuvos miestų bendrojo naudojimo želdynuose“ ir „Kambarinių gėlių sortimento kaita Lietuvoje“.

Keywords: *research, assortment, landscape, container planting, recreation, assortment, taxon, urbanization.*

Introduction

Urbanization of environment, the quality of its physical components is especially important for the modern society because more and more people settle down in the cities and towns. Besides the wide spectrum of ecological phenomena it also affects society. Reckless urbanization of natural environment, its intensive use and pollution are one of the main issues of the modern world.

During the last years a lot of research on the urbanized environment as well cite landscape have been performed and published (Burneika, 2000, Godienė, 2002, Ribokas, 2002 etc.).

The scientific and technological progress always used to raise complex issues concerning the relation between a human being and nature that nowadays gained special importance. During the process of intensive urbanization it is difficult to preserve town nature: the process of changes in relief, the condition as well as the area of water pools and green plantations.

The creation of the town green area systems is important both in the aspect of the optimization of the urbanized environment and preservation of natural values in the urbanized environment. Processes of urbanization aggressively penetrate town squares, parks and parterres. Thus container planting becomes very important. Annual and perennial garden and house (pot) plants are used for this type of planting.

The main tool for the optimization of urbanized environment and town landscape is the formation of the green area system.

In the department of green plantations and agro technologies at the Kaunas College, Faculty of Landscaping in the years 2004-2008 applied scientific research on the topic: „Optimization of ornamental and garden plants assortment, technologies and environment“ has been carried out.

The following topics have been analyzed in the aspect of introduction and acclimatization:

1. „Analysis of the changes in the wildflower assortment and outspread in the general use plantations of Lithuanian cities”.
2. „The changes in the houseplant assortment in Lithuania”.

Aim – to evaluate the applied research in the aspect of ornamental plants introduction and acclimatization carried out in Kaunas College Faculty of landscaping

Objectives:

1. To prepare the differentiated assortment of herbaceous ornamental plants based on scientific research for different natural and ethno social conditions.
2. To compose houseplant (pot plant) assortment based on scientific research according to the classification reflecting separate morphological-decorative characteristics of flowers, the groups of houseplants. To design the assortment of houseplants suitable for the container planting.

Materials and methods

1. The research was carried out following the methodology of phonological observations of ornamental herbaceous plants, biometric measurements and assortment formation prepared by J.Vaidelys. Questionnaire – analysis research was carried out in nine Lithuanian cities.
2. The houseplant assortment research was carried out in the years 2004-2007 in „Tik gėlės“ ltd., „Kalmina“ltd., „Senukų prekybos centras“ltd., company „Lygus kelias“ was also analyzed.

The list of houseplant assortment was designed once a year (in November). In the year 2008 the assortment of the houseplants grown in Lithuania and imported ones was designed.

Results

While performing the research „Analysis of the changes in the wildflower assortment and outspread in the general use plantations of Lithuanian towns” in the years 2004-2006 the flower assortment in the community green plantations of Alytus, Anykščiai, Druskininkai, Marijampolė, Prienai, Ukmergė, Utena, Varėna and Vilkaviškis towns was analyzed and the received data was compared with the flower assortment recorded in these towns in 1980-1983.

Flower assortment has been expanded. If in the former years 1980-1983 the flowers of 78 taxons were grown, in the years 2004-2006 – the flowers of 106 taxons were used. There has been a huge expansion in the assortment of annual flowers (respectively 15 and 30 taxons) and perennial, flowers that are not wintering outside (3 and 7 taxons). This can be explained by a longer decorative period of these flower groups. There has been a slight increase in the use of perennial flowers (54 and 64 taxons), but the use in biennial flowers and roses has decreased. This can be explained by rather complicated care of roses especially when preparing for winter and not every town has a full time plantation supervisor (table 1 and Table 1).

The changes of perennial flower taxons expressed by percentage have altered slightly (69,22 and 62,27 %) this meets the recommendations for the town plantations.

There has been significant increase in the number of flower taxons in the towns of Druskininkai (21-45 taxons), Anykščiai (12-24 taxons), Varėna (18-27 taxons). The number of flower taxons decreased in the towns of Vilkaviškis, Utena, Ukmergė and Alytus. The similar level remained in Marijampolė and Prienai (Figure 1).

Table 1.

The amount of flower bio ecological groups in Lithuanian towns (J.Vaidelys, 2006)

Total number of taxons	Town	Year of research	Bio ecological group of flowers									
			Annuals		Biennials		Perennials		Perennials, not wintering outside		Roses	
			Taxons	%	Taxons	%	Taxons	%	Taxons	%	Taxons	%
23	Alytus	1980 – 1983	7	30,43	1	4,35	14	60,87	1	4,35	0	0
18		2004 - 2006	4	22,20	0	0,0	11	61,14	2	11,11	1	5,55
12	Anykščiai	1980 – 1983	9	75,00	0	0,0	2	16,67	0	0,0	1	8,33
24		2004 - 2006	12	50,00	1	4,17	9	37,50	2	8,33	0	0,0
21	Druskininkai	1980 – 1983	5	23,81	0	0,0	12	57,15	2	9,52	2	9,52
45		2004 - 2006	15	33,3	1	2,2	23	51,17	6	13,30	0	0,0
15	Marijampolė	1980 – 1983	6	60,00	2	13,33	4	26,67	2	13,33	1	6,67
17		2004 - 2006	7	41,17	0	0,0	10	58,83	0	0,0	0	0,0
10	Prienai	1980 – 1983	8	80,00	0	0,0	0	0,0	1	10,00	1	10,00
14		2004 - 2006	6	42,86	2	14,29	4	28,56	2	14,29	0	0,0
25	Ukmergė	1980 – 1983	6	24,00	0	0,0	16	36,00	2	8,00	1	4,00
18		2004 - 2006	5	27,78	1	5,56	9	50,01	2	11,11	1	5,56
28	Utena	1980 – 1983	7	30,43	0	0,0	18	60,87	2	8,70	0	0,0
19		2004 - 2006	3	15,79	0	0,0	14	73,68	2	10,53	0	0,0
18	Varėna	1980 – 1983	5	27,78	1	5,56	12	67,17	0	0,0	0	0,0
27		2004 - 2006	8	28,57	2	7,14	15	57,15	2	7,14	0	0,0
31	Vilkaviškis	1980 – 1983	9	29,03	0	0,0	18	58,06	3	9,68	1	3,23
20		2004 - 2006	4	20,00	0	0,0	15	75,00	1	5,00	0	0,0

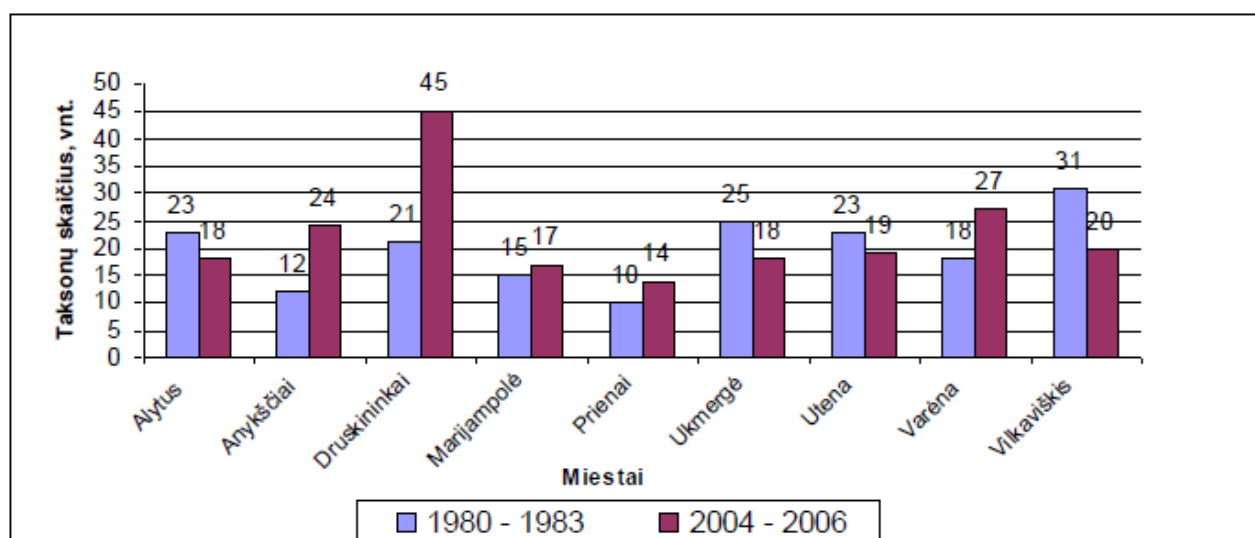


Fig. 1. The change in the number of flower taxons in Lithuanian towns

The biggest areas in the researched towns were mostly planted with: *Begonia semperflorens* Link. Et Otto, *Petunia hybrida hort.*, *Salvia splendens* Ker.-Gawl., *Tagetes patula* L., *Senecio bicolor* L., *Bergenia crassifolia* (L.) Fritsch., *Hylotelephicum spectabile* L., *Hosta plantaginea* (Lam.) Aschers., *Iris hybrida hort.*, *Iris sibirica* L., *Begonia tuberhybrida* Voss., *Impatiens walleriana* L., *Canna indica* L., *Pelargonium zonale* Ait.

New species that were started to be grown are *Argyranthemum frutescens* L., *Calibrachoa spec*, *Gazania ringens* L., *Helichrysum petiolare* Ait., *Perilla frutescens* (L.) Britt., *Ricinus communis* L., *Sanvitalia procumbens* L., *Sutera cordata* L., *Alchemilla mollis* L., *Festuca glauca* L.. There has been an expansion in the assortment of *Hosta spec.*.

However there has been decrease in the use of representatives of *Ageratum houstonianum* Mill., *Dahlia cultorum* Simplex, *Lobularia maritima* Desv., *Zinnia elegans* Jacq., *Cerastium tomentosum* L., *Phlox paniculata* L., *Saxifraga spec.* and *Sedum spec.* genus.

These are ornamental, however slightly more difficult to grow flowers that require more care. It was observed that the flower assortment was influenced by the firms cultivating flower seedlings that are located near the towns (V.A. Žemaičių – near Druskininkai, the company of „Original Erfurt seeds” – in Anykščiai). These are the factors influencing the introduction process. The assortment of houseplants in Lithuania is partially formed and alters slightly. The houseplants from Netherlands, Poland, Germany, Scandinavian and other countries predominate in Lithuanian market. In spite of the huge supply of the flowers from foreign countries there has been an interest in nice flowering houseplants cultivated in Lithuania: cyclamens, gorgeous euphorbia, primroses, and chrysanthemums. Because of the good quality flowers cultivated in Lithuania are popular among the buyers.

In the assortment of ornamental flowers composed in 1971 19 species of nicely flowering flowers, 26 species of flowers with ornamental leaves and 23 species of succulents were described.

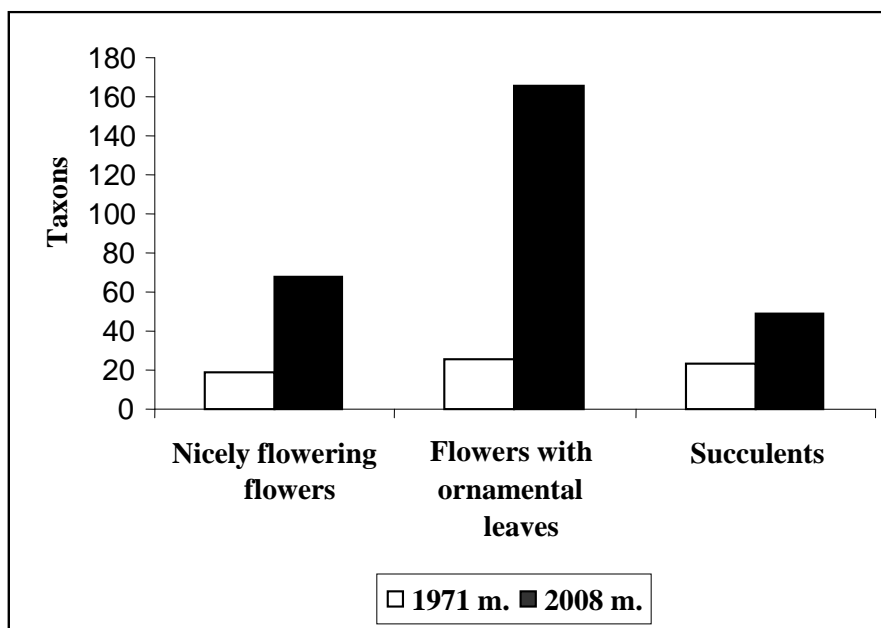


Fig. 2. The change in the number of houseplant taxa according to the groups reflecting morphological – decorative flower characteristics

After performing research in 2008 the list of houseplant assortment has been composed. The assortment contains houseplants sold by the companies selling and exporting houseplants. The assortment does not describe plant species as constantly changing taxonomic parameter. Assortment includes 283 taxa of houseplants: 68 taxa (24,02%) of nicely flowering plants, 166 taxa (58,65%) of houseplants with ornamental leaves and 49 taxa (17,31%) of succulents (Table 2). Comparing the years 1971 and 2008 it was observed that the assortment of nicely flowering plants has increased by 49 taxa, the assortment of plants with ornamental leaves by 140 taxa and the one of succulents by 26 taxa (Table 2).

Table 2.

The amount of houseplant groups according to morphological - decorative characteristics in the researched enterprises (L. Markevičienė, 2008)

Total number of taxons	Enterprises	Year of research	Nicely flowering plants		Flowers with ornamental leaves		Succulents	
			Taxons	%	Taxons	%	Taxons	%
209	„Senukų prekybos centras“ ltd.	2004 - 2005	43	20,57	124	59,33	42	20,09
296		2006 - 2007	69	23,31	167	56,41	60	20,27
117	„Tik gėlės“ltd.	2004 - 2005	20	17,09	69	58,97	28	23,93
127		2006 - 2007	25	19,68	72	56,69	30	23,62
100	„Kalmina“ ltd.	2004 - 2005	21	21,00	61	61,00	18	18,00
75	„Lygus kelias“ ltd.	2004 - 2005	12	16,00	53	70,66	10	13,33

In order to find the most popular houseplants, the volume of sales and the change in assortment the sales of houseplant were examined in the private limited company „Senukų prekybos centras“.

On the basis of the research data it is possible to assert that plant sales increase every year: in the year 2005 – 18 822 plants were sold, in the year 2006 – 22 315, and in 2007 – 22 375 plants were sold. The sales increase every year. Plants are bought not only for interiors but also for the decoration of exteriors and container planting because it is one of the possibilities for the plantation of blocks of apartments as well as heavily urbanized areas. It is considered that the demand for houseplants will increase in the future because the plants are decorative; there is wide assortment of these plants as well as the range of their application. Houseplants are used to decorate not only different premises, but many plants in summer can grow outside, in terraces and balconies, they can be used for container planting.

The container planting and the decoration of buildings with pot plants is getting more popular in Lithuania, but Lithuanian towns still lack this method of plantation. Thus, container planting is one of the possibilities for the plantation of blocks of apartments and heavily urbanized areas.

The following nicely flowering plants are best suitable for container planting: *Rhododendron indicum* L., *Chrysanthemum* L., *Fuchsia* L., *Gerbera* L., *Kalanchoe. blossfeldiana* Poelln., *Hibiscus rosa-sinensis* L., *Camellia* L., *Nerium* L., *Pelargonium* L ‘Her, *Primula* L., *Impatiens* L. Flowers with ornamental leaves: *Aspidistra* Ker Gawl. , *Begonia* L., *Dracaena* Vand. Ex L., *Yucca* L., *Nolina* Michx (sin. *Beaucarnea recurvata*), *Euonymus* L., *Peperomia* Ruiz et Pav, *Sansevieria* Thunb. , *Hedera* L., *Plectranthus*. Succulent: *Agave* L. , *Aloe* L. *Echeveria* DC., *Opuntia ficus – indica* Mill., *Sedum* L. etc.

Conclusions

1. The assortment of flowers in the researched towns (Alytus, Anykščiai, Druskininkai, Marijampolė, Prienai, Ukmergė, Utena, Varėna and Vilkaviškis) during the last 20 years has increased by 28 taxons. More annual and perennial flowers that cannot be grown outside in winter are cultivated because these flowers have longer decorative period. The towns have regular parterres, accumulated in the town centers. And the free planned parterres in the parks contain perennial flowers.

The biggest number of taxons (45) was recorded in Druskininkai, their compositions are the most beautiful and they occupy the largest area.

The most popular flowers are *Begonia semperflorens* Link. Et Otto, *Petunia hybrida hort.*, *Salvia splendens* Ker.-Gawl., *Tagetes patula* L., *Senecio bicolor* L., *Bergenia crassifolia* (L.) Fritsch., *Hylotelephicum spectabile* L., *Hosta plantaginea* (Lam.) Aschers., *Iris hybrida hort.*, *Iris sibirica* L., *Begonia tuberhybrida* Voss., *Impatiens walleriana* L., *Canna indica* L., *Pelargonium zonale* Ait..

2. The assortment of houseplants in the year 2008 included 283 taxons of plants: 68 nicely flowering plants, 166 – houseplants with decorative leaves and 49 taxons of succulents.

The changes in the assortment and the sales of houseplants are mostly influenced by the following factors: bio ecological characteristics of a plant, its decorative level, season and possibilities for their application. The most popular are different kinds of *Dracaena*, *Jucca*, *Ficus*, *Saintpaulia*, *Zamia*, *Nolina*, all types of *Succulentus*, *Pelargonium*, *Hedera*, *Fuchsia*. The best houseplants for container planting are the following: *Rhododendron indicum* L., *Chrysanthemum*, *Fuchsia*, *Hibiscus rosa-sinensis*, *Nerium*, *Pelargonium*, *Primula*, *Impatiens*, *Aspidistra*, *Begonia*, *Dracaena*, *Yucca*, *Euonymus*, *Hedera*, *Plectranthus*, *Agave*, *Aloe*, *Echeveria* etc.

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