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EXISTENCE DYNAMIC OF *MATTEUCCIA STRUTHIOPTERIS, ASTRANTIA MAJOR* AND *GERANIUM SANGUINEUM* IN A LONG- TERM ARTIFICIAL PLANT COMMUNITY OF PERENNIALS

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Conclusions and summaries have been made for the observation results of artificially formed perennial plant communities in the Botanical Garden of University of Latvia over 39 years. The dynamics of changes in the horizontal structure of *Matteuccia struthiopteris, Astrantia major, Geranium sanguineum* in plantings in different garden habitats have been analyzed.

Key words: artificially plant community, dinamic of population, growth strategy.

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Introduction

The long term research work is done with artificially formed herbal plants community together with local and introduced plants compositions stability and possibility for long time existence in various appropriate ecotopes of the gardens landscape in the Botanic Garden of Latvia University (Orehovs,1995,1997).

Special attention is paid to studying their expansion intensity, what permits to expose changes in the character of growth of herbaceous species in the conditions of reduced competition based on numerical parameters which characterize changes of them during the years: the density and quantity of plants and spontaneous floristics changes in artificially plants communities.

Including the native plants in the greenery may reduce a pressure from the introduced species on the surrounding flora and permits to provide their preservation in anthropogenic landscapes as natural resource (Naburga- Jermakova, 2005).

The given article is devoted to an existence of dynamic features of three Latvian flora species (*Matteuccia struthiopteris, Astrantia major* and *Geranium sanguineum*) in garden habitats.

Materials and methods

Analysis of two perennial plantings was made: *Astrantia major* and *Matteuccia struthiopteris* were observed on an area of 135 sq.m. The area is shaded by a crown of old *Salix alba* (the type of garden habitat is a woody-plant-under-planting area). The conditions of growth include constant light shade during the vegetative season, strong competition from the root system of a willow, and annual shedding of leaves, forming a layer of leaf litter that is not removed (Orehovs, 1999, I. Nāburga – Jermakova, A. Orehovs 2006).

Plant location and distribution schemes for species were drawn up and the species composition was created in 1967, 1983, 1988 and 1992. The number of plants and population density were calculated in 2003 and 2008.

The data about *Geranium sanguineum* was collected in a planting area of 92.5 sq.m, in a sunny and dry location. The observations and mapping of locations were done in June in 1991, 1992, 1993, 1995, 2004, 2006, 2007 and 2008.

These assumptions enabled us to prepare materials for processing using "Excel" and "Surfer8" programmes.

Results

The location and density of *Astrantia major* and *Matteuccia struthiopteris* have changed compared with the data in 2003.

The area occupied by *Matteuccia struthiopteris* thicket has increased and practically reached 100% of the observed planting area (see fig.1). Simultaneously the density and number of plants have increased (see fig.2). It continues to be dominant in the diffuse community, with a patient-competitive strategy predominating (S_k): *Matteuńcia struthiopteris*, *Primula veris, Tellima grandiflora.* This increases their quantity in the planting. However, juvenile 1-3 years old plants are predominant in the *Tellima grandiflora* population structure, with generative flowering plants only about 10% of the total. The average density of perennials in the community in 2003 and 2008 has not changed (on average 30 plant/sq.m).

Astrantia major: its dynamic in the observed perennial plant community was positive up to 2003 (I. Nāburga – Jermakova, A.Orehovs, 2006). Its occupied area and quantity has decreased in the last five years (see fig.2,3), accompanied by a tendency of isolation from some loci of the population. The isolation is partly a consequence of senile plants. For example, in map areas 4-8 and 6-8 (see fig. 3) they did not flower in the last years.

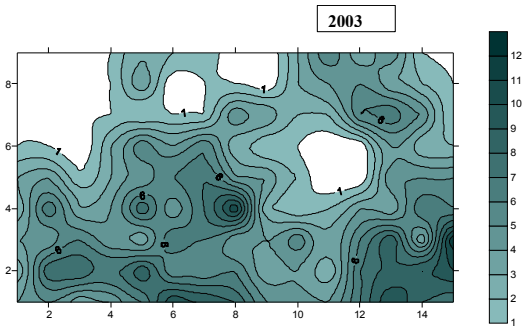
The total quantity and density of plants in the observed community is increasing not so much owing to expansion of the *Geranium phaeum*, *Matteuccia struthiopteris* and *Primula veris* populations, but rather due to some taxa of spring- flowering and bulb plants, which have settled here from the adjacent plantings (*Lilium martagon*, *Hepatica nobilis*, *Hyacinthoides hyspanicum*).

Geranium sanguineum population development in plantings without swards is different from the situation in native conditions. The general reason for this is the formation of 50-60cm long mats of tangled, leafy stems, which in native conditions are only 15-50 cm (Petersone, Birkmane, 1980)) with a protective clump radius of 25-50cm. Over 17 years, the generative thicket-like plant formed a diffusion group structure of coenopopulation (see fig.4) with protective covering over 65.9% of the observed planting area and forced out another vegetative thicket-like rosette plant *Fragaria vesca var. americana*.

From 1991 to 2008 a temporary *Geranium sanguineum* association was created with: *Chionodoxa luciliae* (Gigantea Group), *Duchesnea indica, Euphorbia cyparissias* 'Fens Ruby', *Ficaria verna, Fragaria vesca, Hyacinthoides hispanicum, Scilla sibirica, Verbascum olympicum.*

Conclusions

1. Observation of the plant population in the *Salix alba* planting revealed important fluctuations in the population density and quantity of *Astrantia major*, *Matteuccia struthiopteris, Primula veris* and others.
2. Intensive expansion of *Matteuccia struthiopteris* may be one cause of location change and reduction of population of *Astrantia major*.
3. The artificial plant community 'under *Salix alba*' increases saturation of the species by bulbs and spring- flowering taxa.



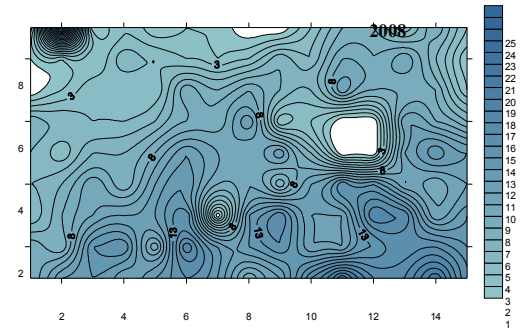
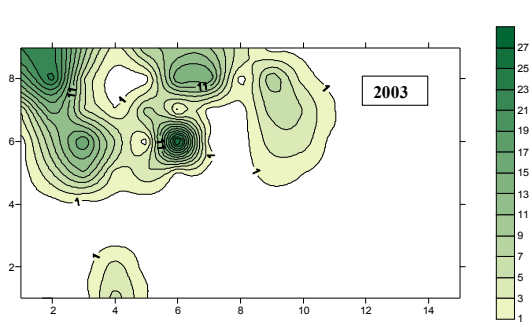


Fig. 1 *Matteuccia struthiopteris* distribution in planting 2003, 2008



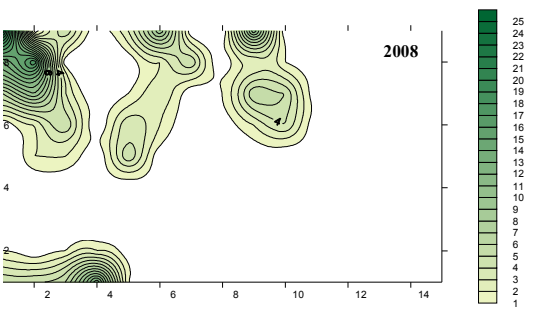


Fig.3 *Astrantia major* distribution in planting in 2003 and 2008

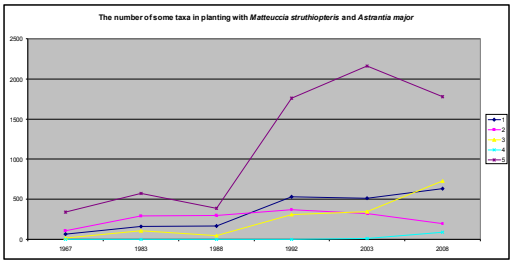


Fig.2 The number of some taxa in planting with *Matteuccia struthiopteris* and *Astrantia major*: 1- *Matteuccia struthiopteris*, 2- *Astrantia major*, 3- *Primula veris*, 4-*Geranium phaeum*, 5-*Tellima grandifolia*

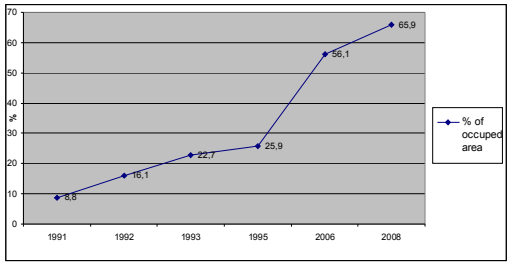


Fig.4 *Geranium sanguineum* proective covering changes in 1991-2008

4. Explained *Geranium sanguineum* type of strategy without grasses sward patient-competition is changed from competitive predominating strategy (S_k) to violent (K) and it is stabile dominant in this artificial plant community.

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