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ASPECTS OF MORPHOLOGICAL DIVERSITY OF OREGANO IN LATVIA

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Abstract. Oregano populations are variable by morphology, cytology, genetics, biochemistry and agrobotany. Using international Draft Descriptor Lists it is possible to describe oregano samples and to select the most variable accessions for cultivation of *Origanum vulgare* L. The aim of this research was to explore the several aspects of morphological diversity of oregano in Latvia. In summer 2012, 44 oregano accessions from an *ex situ* collection of spice- and medicinal plants of the Laboratory of Cultivated Plants and Apilogy (Jelgava, 1 Strazdu str.) were analysed. Plant growth habit, plant height, number of stems per plant, branching density, colour of the upper surface and shape of blade of the leaf, density of flowers, colour of petals were described in this research. The results showed that oregano accessions differ morphologically in Latvia. It is necessary to continue this research to allow plants to fully express their characteristics and to explore the possible changeableness of parameters.

Key words: *Origanum vulgare*, oregano, morphology

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Introduction

Oregano (*Origanum vulgare* L.) is classified as medicinal, spice- and ornamental plant (Hammer & Spahillari 2000). According to the Medicinal and Aromatic Plants Working Group of the European Cooperative Programme for the Plant Genetic Resources (ECPGR MAP) oregano is included in the List of «Priority Species» that are the paramount medicinal and aromatic plants in Europe. The general criteria for including oregano in this document were: actual economic use, current conservation status, endemism, restricted range, recent rate of decline, rarity, eco-geographical distinctiveness, threat of genetic erosion, biological characteristics and importance, cultural importance and high social demand, occurrence and frequency in current protected areas, status of protection, ethnical consideration, taxonomic or phyletic uniqueness or isolation, ecosystem role (Asdal *et al.* 2006).

In Latvia only *O. vulgare* ssp. *vulgare* could be found in nature (Baricevic 2010). Oregano is a common plant in certain areas of Latvia. It is found in dry and middle humid meadows, at the field borders and on dry hills. The wide use of oregano in Latvia is one of the reasons why the wild populations have been gradually depleted (Sivicka 2012). Therefore, it is necessary to cultivate these plants for keeping the biological diversity of the Latvian nature. It is important to use local plants in agrocenosis as they are adapted to the Latvian agroecological conditions and possible stress situations in a specific environment.

It is proved, that oregano populations are variable by morphology, cytology, genetics, biochemistry and agrobotany (Padulosi 1997; Kokkini 1996). The wide heterogenity of oregano represents the individual genetic diversity, the morpho- and ontogenetic variability or modifications due to the environment. Using new international Draft Descriptor Lists, it is possible to describe oregano samples and to select the most variable accessions for cultivation.

The aim of this research was to explore the several aspects of morphological diversity of oregano in Latvia.

Material and methods

The samples for experiment were selected from the ex situ collection of spice- and medicinal plants (N 56°39′47″; E 23°45′13″). It is a fundamental collection in Latvia, attached to the Laboratory of Cultivated Plants and Apilogy (Jelgava, 1 Strazdu str.). The oregano collection was planted in 2008 and reconstructed in 2009. There are 44 accessions of oregano, planted in three rows, each accession in three repetitions. Accessions are in random order. In the process of selection of wild accessions, the latitude and longitude have been registered. The topographic descriptions of places as well as the morphological description of plants have been made. All these data were registered in the system of Nordic Gene Bank. The plants have been collected from nature using the method of professor E. Muižarāja (Žukauska 2008). The main point of this method is the initial visual division of an area into squares and zig-zag passing through these squares, as well as the random gathering of samples.

After the methodology of the Draft Descriptor List *O. vulgare*, which was published in November 2011, characters should be recorded on an average of minimum 10 repetitions. That is why in spring 2012 each accession was propagated by cloning and grown in the field conditions.

The soil at the trial site was strongly altered by cultivation loam with organic matter content of 2.7 $g \cdot kg^{-1}$, soil reaction was slightly acidic (pH KCl – 6.3), P content was 102 $mg \cdot kg^{-1}$ and K content was 207 $mg \cdot kg^{-1}$. Plant care was provided for the *ex situ* collection.

Despite the statement, that characterization should preferably be done during the second year after establishment to allow plants to fully express their characteristics; the previous description of samples was proved at the first year, in summer 2012. It is planned to continue the experiments in the next years too. 2012 year data are important for evaluation of growth dynamics, plant development and productivity, cultivation planning and strategy, economical calculation. These results are important for successful and profitable oregano growing and production in Latvia.

Characters had been recorded on an average of 10 plants per each of 44 oregano accessions. Such parameters as plant growth habit, plant height, number of stems per plant, branching density, colour of the upper surface and shape of blade of the leaf, density of flowers and colour of petals were described for this research (Žukauska & Sivicka 2011).

From the Descriptor List, plant growth habit can be prostate, semi-erect or erect, branching density – sparse, intermediate or dense, density of flowers – very sparse, sparse, medium, dense or very dense. Shape of blade can be ovate, roundish, oblong, rhomboid or other. The colour of petals can be pink, white, purplish red, pale lilac or purple. The colour of upper surface can be pale green, green, dark green, greyish green or other. Plant height were characterized in centimeters.

Results

Plant description had been made until inflorescence emergence. Two parameters – plant growth habit and plant height – were defined in this research. The results showed, that plant growth habit of 15 oregano accessions (34%) was erect, it was prostate for 2 accessions (5%) and semi-erect for 27 accessions (61%). Plant height was measured on fully grown plants, from ground level to the tip of the plant. It varied from 50.1 to 85.0 cm. The average height was 68.14 cm. The data statistical analysis showed that the variability between accessions was significant ($p<0.05$), but between samples of each accession it was non-significant ($p>0.05$).

Stem description had been made at the date of beginning of flowering. Two parameters – number of stems per plant and branching density – were defined in this research. Branching density of 8 oregano accessions (18%) was intermediate and it was sparse for 36 accessions (82%). Number of stems per plant varied from 1 to 14 stems. The average number was 2.5 stems per plant. The data statistical analysis showed that the variability between accessions was significant ($p<0.05$), but between samples of each accession it was non-significant ($p>0.05$).

Leaf description had been made at the date of beginning of blooming; measured leaves are those of the middle node of the leafy part. Two parameters – colour of the upper surface and shape of blade of the leaf – were definded in this research. Colour of the upper surface of 23 accessions (52%) was pale green and it was green for 21 accessions (48%). Shape of blade was oblong for 4 accessions (9%), roundish for 1 accession (2%), rhomboid for 19 accessions (43%), oval for 2 accessions (5%) and other (triangular or reniform with a heart-shaped base) for 18 accessions (41%).

Inflorescence description had been made at the date of full flowering. Two parameters - density of flowers and colour of petals – were definded in this research. Density of flowers was very sparse for 2 accessions (5%), sparse – for 5 accessions (11%), medium – for 10 accessions (23%), dense – for 20 accessions (45%) and very dense – for 7 accessions (16%). Colour of petals was pink for 34 accessions (77%), white – for 5 accessions (11%), purplish red – for 2 accessions (5%), pale lilac – for 1 accession (2%) lilac – for 2 accessions (5%).

Discussion and Summary

The results showed that oregano accessions differ morphologically in Latvia by beforementioned characters. It is important to conserve biodiversity of oregano in Latvia. On the other site, it is important to select more productive accessions for cultivation. The research of morphological characters can help to evaluate plant growth material.

It is preferable to use the erect plant growth habit in agrocenosis (mechanical harvest is possible, easy and cheap plant growing process can be provided). The maximal oregano plant height was 90 cm in Latvia (Asdal *et al.* 2006). In this research it was 85 cm, but average result was 68.14 cm, that is good result – more than 50 cm (Sivicka & Žukauska 2011). Also, it is a perfect result for the first year of characterization after establishment.

Speaking about the number of stems and branching density, it is difficult to provide optimal result (10 stems per plant and dense branching). That is why it is important to explore the growth and dynamics in the next years.

It is important to correlate the results of colour of the upper surface, shape of blade, colour of petals and density of flowers with content and composition of essential oil.

It is necessary to continue this research next years to allow plants to fully express their characteristics. It is important to explore the possible changeableness of parameters and the influence of meteorological conditions on oregano growing and plant production.

Draft Descriptor List contents just 60 parameters for *O. vulgare*. It is recommended to describe plants more thoroughly.

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