SIX NEW DAHLIA CULTIVARS OF LITHUANIAN ORIGIN

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Abstract

According to the rules of International Code of Nomenclature for Cultivated Plants 6 new cultivars of Dahlia published: 'Meška Slapukė' (No. 255, 2011, A. Balsevičius), 'Tumė' (No. 256, 2011, A. Balsevičius), 'Dalelytė' (No. 14-15, 2014, A. Balsevičius), 'Giedrės Kasos' (No. 14-18, 2014, A. Balsevičius), 'Lapė' (No. 14-71, 2014, A. Balsevičius), and 'Orija' (No. 14-37, 2014, A. Balsevičius). In 2011, dahlias were selected by traditional breeding methods. In 2014, plant seeds of open pollination were treated by cold plasma at a pressure of 60 Pa.

Key words: *Dahlia, new cultivars, selection, Lithuania*

1. INTRODUCTION

Dahlia Cav. is a member of *Asteraceae* Bercht. et J.Presl family. Plants of *Dahlia* genus are native to South America but *Dahlia* hybrid varieties are grown in all over the world.

Formal history of genus *Dahlia* begins in the late 18th century in Spain, where Antonio José Cavanilles (1791, pp. 56-57) gave the genus its Latin name in commemoration of Swedish botanist Andreas Dahl. Cavanilles, then a senior member of the staff of the Royal Botanic Garden in Madrid received seeds of Mexican plants. Plants grown from these seeds were cultivated in Madrid and comprised the materials upon which Cavanilles based his description of genus *Dahlia* and first described species *Dahlia pinnata* Cav. (Sørensen 1970). The genus *Dahlia* is divided into four sections with a total of 38 species (Schie & Debener 2013). The Plant List database (2013) provides 36 accepted names of *Dahlia* species and one nothospecies (*Dahlia* × *hortensis* Guillaumin) which encompasses all cultivated *Dahlia* hybrids.

Even from the earliest days of the scientific period of its history, the dahlia was a cultivated plant in Mexico before and soon after the Spanish conquest (Sørensen 1970). *Dahlia* cultivars are very popular ornamental plants and show a high variation in flower colours and morphology. Interest in the garden dahlia has, in its brief modern history, generated the founding of dahlia societies on both sides of the Atlantic (Sørensen 1970). The present common ornamental types of *Dahlia* are assumed to originate from crosses between *Dahlia coccinea* Cav., *Dahlia sorensenii* H.V. Hansen et Hjert. and natural *Dahlia* hybrids at the end of the 18th century after the import of species and hybrids described by Cavallines from Mexico to Europe (Meyer 1991, Hansen & Hjerting 1996, Schie & Debener 2013). About one hundred years later *Dahlia juarezii* Van der Berg, hybridised to garden forms leading to the cactus dahlias (Meyer 1997). Due to this complex history and several decades of further hybridisations between cultivars and species genetic relationships between present day cultivars remain elusive (Wegner & Debener 2008).

Sørensen (1970) divided *Dahlia* history into several periods, each of which serves to focus attention upon one or a few major developments:

1) Prehistorical and early historical period (c. 1552-1790);

2) Period of early scientific description (1790-1796);

3) Early introduction and distribution of first modern cultivars and species (1796-1804);

4) Early breeding period (1804-1814);

5) Controlled breeding period (1814-1929);

6) Genetic breeding period (1929-present);

7) Period when nutritional control in cultivation was applied (? - present).

Currently, there are more than 15 000 known cultivars (Schie & Debener 2013), for which 14 (The Royal Horticultural Society 2015) or 21 (American Dahlia Society 2016) different horticultural groups are distinguished based on flower structure.

Current efforts for breeding new cultivars mainly aim at new combinations of flower colour and flower morphology. Resistances against pests and pathogens as for example powdery mildew are desirable but currently not followed in practical breeding programs, which, up to now, remained very simple and are almost exclusively based on the selection of seedlings from uncontrolled open pollinated progeny (Behr & Debener 2004). The complicated genetics and the great number of flower colour genes involved, make it difficult to predict which cultivars may or may not give positive results (Broertjes & Ballego, 1967).

The use of induced mutations has over the past 50 years played a major role in the development of superior ornamental crop cultivars. A large number of new promising cultivars have been successfully developed in different ornamental plants by mutation techniques using both ionizing radiations and other mutagens. The concept of using induced mutagenesis for ornamental crop improvement using different physical and chemical mutagens developed dates back to the beginning of the 20th century (Datta 2012). A number of flower colour mutants have been developed and commercialized in *Dahlia* using radiation (Grabowska and Mynett 1964; Broertjes and Ballego 1967; Dube et al. 1980). Colchicine has been successfully used for inducing somatic flower colour mutations (Datta 2012).

2. MATERIALS AND METHODS

2.1. Plant material

To develop new dahlias cultivars open pollinated seeds harvested in 2010 and in 2013. *Dahlia* cultivar 'Nuit d'Eté', Chevalier, 1970 (FR) seeds harvested in 2010. This is an old French origin cultivar, which is assigned to Group 8-Cactus Dahlias. It grows under Lithuanian climate conditions ideally and usually matures a lot of seeds. In 2011, in spring seeds from the dahlia cultivar 'Nuit d'Eté' were sown in the greenhouse and later plantlets were unpotted and planted in field beds. In 2011 two seedlings after flowering were selected and vegetatively propagated. In 2013 seeds of Group 11-Fimbriated Dahlias: 'Mingus Leroy T', Phil Mingus, 2001 (US), and 'Anna Marie', Cor Geerlings, 1997 (NL), and seeds of Group 5-Formal Decorative Dahlias: 'Melody Mambo', Gerb. Verwer, 2001 (NL), and 'Golden Cream' (unknown origin) were harvested. Open pollinated plant seeds were treated by cold plasma at a pressure of 60 Pa and sown in greenhouse in spring. Plantlets were unpotted and planted in field beds. In 2014 first seedlings were selected and reproduced. In 2016, all selected cultivars were propagated for flowerbed expositions. In 2010-2015 dahlias breeding were carried out in Botanical Garden of Station of Nature Research and Environmental Education (BGCI Institution Code – Marij). After the closure of this garden breeding continued in Kaunas Botanical Garden of Vytautas Magnus University (BGCI Institution Code – KAUN).

2.2. Seeds treatment by cold plazma

Seeds were packed into small plastic bags and taken to the B. I. Stepanov Institute of Physics of NAS of Belarus, (Minsk, Belarus) for treatment with physical stressors. The low-pressure capacitive coupled radio frequency discharge operated at 5.28 MHz in a planar geometry reactor, which consisted of two plane-parallel, water-cooled copper electrodes (120-mm diameter) placed in a stainless steel vacuum chamber with inner volume of 0.053 m3. Plant seeds were processed with air plasma at a pressure of 60 Pa. The specific power applied to the discharge was 0.35 W/cm3. Under the experimental conditions, the gas temperature did not exceed 310 K (37°C) (Filatova & al. 2014). Seeds were evenly dispersed on the surface of an open, sterile Petri dish that was placed on the grounded electrode before pumping air from the chamber. In every experiment, before plasma ignition between the electrodes, a pressure of 60 Pa (partial vacuum) was achieved by pumping air from the

chamber for approximately 7 min. Therefore, a 7-min "vacuum" treatment was used as an additional control in the CP experiments. The duration of further CP exposure was 5 min. Seed treatments were replicated three times.

It is shown that plasma treatment result in the increase of the laboratory and field germination of seeds as well as their vitality, in the reduction of seed contamination level with fungal infections (Filatova & al. 2011).

2.3. Description of new cultivars

Documentation of new cultivars is important for archival purposes. Basic information on new cultivars that includes derivation of the name; uniqueness; origin; a quantitative description; cultural information, including propagation, vouchering, or registration; and availability is recommended to provide (Fantz 1996).

New cultivars described and named following rules of International Code of Nomenclature for Cultivated Plants (Brickell 1980). Requirements of The Royal Horticultural Society The International Dahlia Register (The Royal Horticultural Society 2015) for cultivar descriptions taken into account. Colours determined by using The Royal Horticultural Society's colour chart, fifth edition (Royal Horticultural Society 2007).

3. RESULTS AND DISCUSSION

3.1. Overview of Dahlia introduction and selection in Lithuania

Dapkūnienė (2015) points out that a writer dr Stanislaw Morawski was the first dahlia grower who was born and lived in Ustronė (Jundeliškės) manor in Lithuania. About the middle of 19th century he brought dahlias from Poland and grew them near his manor, then they spread all over Lithuania. Dahlias are enjoying a renaissance in popularity in the last year in Lithuania. Increaslingly farmsteads environment is decorated by dahlias.

Dahlias, like most other Lithuanian cultivars are created by sexual hybridization or selected from existing cultivars of spontaneous mutations. The first Lithuanian dahlia cultivars creator - P. Rotomskis (Ogorodnikienė & Juronis). However, it is not known whether his created cultivars survived or not. In 2013, 15 Lithuanian cultivars received a National Plant Genetic Resources status (Dapkūnienė 2015). Morphological and phenological investigations on 26 Lithuanian dahlia cultivars were carried out in Kaunas Botanical Garden of Vytautas Magnus University (Varkulevičienė & Matulevičiūtė 2008). In Lithuania over than 100 cultivars of dahlia created, but non-professional breeders carry out the selection, therefore new cultivars are neither published nor registered. Also there is no national compendium of dahlia cultivars.

3.2. New Dahlia cultivars description.

Dahlia 'Meška Slapukė', 2011, A. Balsevičius (LT) (Fig. 1)

1. Classification: Group 9 – Semi-Cactus Dahlias.

2. Original seedling no. 256.

3. Seed parent (♀) 'Nuit d'Eté', Chevalier, 1970 (FR).

4. Pollen parent (♂) unknown (seeds of open pollination).

5. Hybridised by Arūnas Balsevičius, 2011, Botanical Garden of Station of Nature Research and Environmental Education (BGCI Institution Code – Marij). Marijampolė municipality, LT-69359 Karužai village, Lapanka St., Lithuania.

6. Grown to first flower by Arūnas Balsevičius, 2011, Botanical Garden of Station of Nature Research and Environmental Education (BGCI Institution Code – Marij). Marijampolė municipality, LT-69359, Karužai village, Lapanka St., Lithuania.

7. Named by Arūnas Balsevičius, 2011, Botanical Garden of Station of Nature Research and Environmental Education (BGCI Institution Code – Marij). Marijampolė municipality, LT-69359, Karužai village, Lapanka St., Lithuania.

8. Stem height, m – 0.85.

9. Flower diameter, mm – 110.

10. Colour of outer florets – RHS purple 79A or red-purple 72B.

11. Colour of inner florets – RHS purple 79A or red-purple 72B.

12. Named after originator friend and colleague nickname Meška (Beer). Slapukė means secretive. First flowers are hidden in foliage.

13. Availability. Kaunas Botanical Garden of Vytautas Magnus University, Ž.E. Žilibero St. 6, 46324, Kaunas, Lithuania.

14. Suitability. Suitable for establishment of mixed flowerbeds and cutting.

15. Compared to plant of the female parent, the cultivar 'Nuit d'Eté', the plants of the new *Dahlia* differ in form of the inflorescence ('Nuit d'Eté' belongs to – Group 8 – Cactus), more slender and graceful form of the inflorescence, lower and more compact plant form habit.



Fig. 1. Dahlia 'Meška Slapukė'

Dahlia 'Tumė', Arūnas Balsevičius, 2011 (LT) (Fig. 2).

1. Classification – Group 9 – Semi-Cactus.

2. Original seedling no. 255.

3. Seed parent (♀) 'Nuit D'ete', Chevalier, 1970 (FR).

4. Pollen parent (♂) unknown (seeds of open pollination).

5. Hybridised by Arūnas Balsevičius, 2011, Botanical Garden of Station of Nature Research and Environmental Education (BGCI Institution Code – Marij). Marijampolė municipality, LT-69359 Šunskai Post office, Karužai village, Lapanka St., Lithuania.

6. Grown to first flower by Arūnas Balsevičius, 2011, Botanical Garden of Station of Nature Research and Environmental Education (BGCI Institution Code – Marij). Marijampolė municipality, LT-69359 Šunskai Post office, Karužai village, Lapanka St., Lithuania.

7. Named by Arūnas Balsevičius, Botanical Garden of Station of Nature Research and Environmental Education (BGCI Institution Code – Marij). Marijampolė municipality, LT-69359, Karužai village, Lapanka St., Lithuania.

8. Stem height, m – 0,6.

9. Flower diameter, mm – 100.

10. Colour(s) of outer florets – RHS red-purple 57D or red-purple 66B.

11. Colour(s) of inner florets – RHS red-purple 57D or red-purple 66B.

12. Named after originator friend and colleague nickname (untranslatable).

13. Availability. Kaunas Botanical Garden of Vytautas Magnus University (BGCI Institution Code – Kaun) , Ž.E. Žilibero St. 6, 46324, Kaunas, Lithuania.

14. Suitability. Suitable for the establishment of mixed flowerbeds.



Fig. 2. Dahlia 'Tumė'

Dahlia 'Orija', 2014, A. Balsevičius (LT) (Fig. 3)

1. Classification Group 5 – Formal Decorative Dahlias.

2. Original seedling no. 14-37.

3. Seed parent (♀) 'Mingus Leroy T', Mingus, 2001 (US).

4. Pollen parent (♂) unknown (seeds of open pollination).

5. Hybridised by Arūnas Balsevičius, 2014, Botanical Garden of Station of Nature Research and Environmental Education (BGCI Institution Code – Marij). Marijampolė municipality, LT-69359 Šunskai Post office, Karužai village, Lapanka St., Lithuania.

6. Grown to first flower by Arūnas Balsevičius, 2014, Botanical Garden of Station of Nature Research and Environmental Education (BGCI Institution Code – Marij). Marijampolė municipality, LT-69359 Šunskai Post office, Karužai village, Lapanka St., LITHUANIA.

7. Named by year and address – Arūnas Balsevičius, 2014, Kaunas Botanical Garden of Vytautas Magnus University(BGCI Institution Code – Kaun) , Ž.E. Žilibero St. 6, 46324, Kaunas, Lithuania.

8. Stem height, m – 0,7.

9. Flower diameter, mm – 110.

10. Colour(s) of outer florets – RHS violet-blue 91C.

11. Colour(s) of inner florets – RHS red-purple N78A.

12. Named after Lake Orija in Southwestern Lithuania.

13. Availability. Kaunas Botanical Garden of Vytautas Magnus University (BGCI Institution Code – Kaun), Ž.E. Žilibero St. 6, 46324, Kaunas, Lithuania.

15. Suitability. Suitable for the establishment of homogeneous dahlia groups flowerbeds and cutting.



Fig. 3. Dahlia 'Orija'

Dahlia 'Giedrės Kasos', 2014, A. Balsevičius (LT) (Fig. 4)

1. Classification Group 11 – Fimbriated Dahlias.

2. Original seedling no. 14-18.

3.Seed parent (♀) 'Anna Marie', Cor Geerlings, 1997 (NL).

4. Pollen parent (♂) unknown (seeds of open pollination).

5. Hybridised by Arūnas Balsevičius, 2014, Botanical Garden of Station of Nature Research and Environmental Education (BGCI Institution Code – Marij). Marijampolė municipality, LT-69359 Šunskai Post office, Karužai village, Lapanka St., Lithuania.

6. Grown to first flower by Arūnas Balsevičius, 2014, Botanical Garden of Station of Nature Research and Environmental Education (BGCI Institution Code – Marij). Marijampolė municipality, LT-69359 Šunskai Post office, Karužai village, Lapanka St., LITHUANIA.

7. Named by Arūnas Balsevičius, 2014, Kaunas Botanical Garden of Vytautas Magnus University (BGCI Institution Code – Kaun) , Ž. E. Žilibero St. 6, 46324, Kaunas, Lithuania

8. Stem height, m – 1,0.

9. Flower diameter, mm – 130.

10. Colour(s) of outer florets – RHS red 43A or red 33C.

11. Colour(s) of inner florets – RHS red 43A or red 33C.

12. Named after originator friend, colleague and this paper co-author name Giedrė. It means Giedrė's plaits.

13. Availability. Kaunas Botanical Garden of Vytautas Magnus University (BGCI Institution Code – Kaun), Ž. E. Žilibero St. 6, 46324, Kaunas, Lithuania.

14. Suitability. Especially it is suitable in huge mixed flowerbeds.



Fig. 4. Dahlia 'Giedrės Kasos'

Dahlia 'Dalelytė', 2014, Arūnas Balsevičius (LT) (Fig. 5)

1. Classification – Group 10 – Miscellaneous Dahlias.

2. Original seedling no. 14-15.

3. Seed parent (♀) 'Melody Mambo', Gerb. Verwer, 2001 (NL).

4. Pollen parent (♂) – unknown (seeds of open pollination).

5. Hybridised by Arūnas Balsevičius, 2014, Botanical Garden of Station of Nature Research and Environmental Education (BGCI Institution Code – Marij). Marijampolė municipality, LT-69359 Šunskai Post office, Karužai village, Lapanka St., Lithuania.

6. Grown to first flower by Arūnas Balsevičius, 2014, Botanical Garden of Station of Nature Research and Environmental Education (BGCI Institution Code – Marij). Marijampolė municipality, LT-69359 Šunskai Post office, Karužai village, Lapanka St., Lithuania.

7. Named by Arūnas Balsevičius, 2014, Kaunas Botanical Garden of Vytautas Magnus University (BGCI Institution Code – Kaun), Ž. E. Žilibero St. 6, 46324, Kaunas, Lithuania.

8. Stem height, m – 0,35.

9. Flower diameter, mm – 90.

10. Colour(s) of outer florets – RHS red-purple 60B.

11. Colour(s) of inner florets – RHS red-purple 60B.

12. Named after originator friend and colleague name Dalytė. In English Dalelytė means a small particle (it is a pun). A name is given for a particular feature of the cultivar – short and compact plant form habit.

13. Availability. Kaunas Botanical Garden of Vytautas Magnus University (BGCI Institution Code – Kaun), Ž. E. Žilibero St. 6, 46324, Kaunas, Lithuania.

15. Suitability. Suitable for the establishment of mixed flowerbeds.



Fig. 5. Dahlia 'Dalelytė'

Dahlia 'Lapė', 2014, Arūnas Balsevičius (LT) (Fig. 6)

1. Classification Group 5 – Formal Decorative Dahlias.

2. Original seedling no. 14-71.

3. Seed parent (♀) 'Golden Cream' (unknown origin).

4. Pollen parent (♂) unknown (seeds of open pollination).

5. Hybridised by Arūnas Balsevičius, 2014, Botanical Garden of Station of Nature Research and Environmental Education (BGCI Institution Code – Marij). Marijampolė municipality, LT-69359 Šunskai Post office, Karužai village, Lapanka St., Lithuania.

6. Grown to first flower by Arūnas Balsevičius, 2014, Botanical Garden of Station of Nature Research and Environmental Education (BGCI Institution Code – Marij). Marijampolė municipality, LT-69359 Šunskai Post office, Karužai village, Lapanka St., Lithuania.

7. Named by Arūnas Balsevičius, 2014, Kaunas Botanical Garden of Vytautas Magnus University (BGCI Institution Code – Kaun), Ž.E. Žilibero St. 6, 46324, Kaunas, Lithuania.

8. Stem height, m – 0,8.

9. Flower diameter, mm – 80.

10. Colour(s) of outer florets – RHS orange-red 33D.

11. Colour(s) of inner florets– RHS orange-red 33C.

12. Lapė means a fox. A name is given due to a colour of the inflorescence.

13. Availability. Kaunas Botanical Garden of Vytautas Magnus University (BGCI Institution Code – Kaun), Ž.E. Žilibero St. 6, 46324, Kaunas, Lithuania.

15. Suitability. Suitable for the establishment of the flowerbeds and cutting.



Fig. 6. Dahlia 'Lapė'

New described six Dahlia cultivars according to The Royal Horticultural Society belong to 4 classification groups: 2 – Group 5 – Formal Decorative Dahlias ('Lapė' and 'Orija'), 2 – Group 9 – Semi-cactus Dahlias ('Meška Slapukė' and 'Tumė'), 1 – Group 10 Miscellaneous Dahlias ('Dalelytė'), and 1 – Group 11 – Fimbriated Dahlias ('Giedrės Kasos').

Inflorescences of 'Giedrės Kasos' (130 mm), 'Orija' and 'Meška Slapukė' (0,11 mm), 'Tumė' (100 mm) assigned to small flowered dahlias both 'Lapė' (80 mm) and 'Dalelytė' – to miniature flowered dahlias.

'Giedrės Kasos' (1 m) ascribed to tall dahlias but others like 'Meška Slapukė' (0,85 m), 'Lapė' (0,8 m), 'Orija' (0,7 m), 'Tumė' (0,6 m) – to medium height, and 'Dalelytė' (0,35 m) – to tiny ones.

All new described plant cultivars grow in the dahlias collection in Kaunas Botanical Garden of Vytautas Magnus University.

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