

**ANALYSIS OF TAXONOMIC COMPOSITION OF FAMILY *MORACEAE*  
LINDL. IN BOTANICAL GARDENS OF KYIV AND PERSPECTIVES OF ITS  
ENRICHMENT**

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Inventory and determination of the taxonomic composition of the family (Moraceae Lindl.) in the collection forest stands of botanical gardens in Kyiv was made. On a base of comparative analysis, there were found the opportunities of enrichment with the new types of collections and cultivars for wide implementation in green decorative landscaping in the public use places.

**Key words:** *family Moraceae, taxonomic composition, botanical garden, decorative green stands, cultivars.*

The process of increasing the number of cities and industry has negative influence on the environment. Contamination of big cities and other highly populated local places in many cases exceeds the capacity of self-purification of natural ecosystems. For such conditions the role of green tree stands extremely increases. They prevent the harmful effects of contamination or decrease its impact and in some cases they get hard effects of pollution and require protection.

Green tree stands are very effective tool for optimization of environmental conditions in urban complexes. Decorative planting perform sanitary- hygiene, decorative, environmental and cultural-educational role [3].

Decorative planting improves the environmental conditions in a way of accumulation the dust, toxic gases and mitigate microclimate.

To improve the conditions in the cities, it is appropriate to use plants that are

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resistant to the gas and dust emission and feel themselves well in the urban environment. One of such resistant plants considered to be white mulberry that grows and develops in a proper way in urban condition. White mulberry is very decorative and presents high interest of use in landscaping.

The potential of botanic gardens, as a source of mobilization of the world's flora (for commercial use) in Ukraine is not fully used, we consider that it is advisable to pay attention on other species from family *Moraceae* except genus *Morus* L., that were also introduced in Ukraine, but not very widespread, which include: *Broussonetia* L'Herit., *Maclura* Nutt., *Cudrania* L., *Ficus* L.

Family *Moraceae* has about 60 genus which are distributed mainly in tropical countries [4].

**The aim of research:** it was made an inventory, analysis of taxonomy composition of *Moraceae*, determined the prospects of enrichment the collection of mulberries with new species and its forms for planting in Kyiv.

**Materials and methods.** The study carried out during 2011-2012 on the collection areas with unprotected soils in botanical gardens of Kyiv, namely: in the National Botanical Garden after "M.M. Gryshka" (further NBG of M.M. Gryshka), in the Botanical Garden after "O.V. Fomina" of Kyiv National University of Tarasa Shevchenka (further – BotGarden KNU), in the Botanical Garden of National University of Life and Environmental Sciences of Ukraine (further – BotGarden of NULES of Ukraine).

The research was made on a base of modern views on the systematics and taxonomy of plants. To clarify the taxonomic composition and providing the analyses of species and their forms diversity of the family *Moraceae* an inventory of collections Mulberries according to technique of V.S. Tedoronskogo was made [5]. The clarifying of priorities of the family names held by modern taxonomic sources of information [6, 7].

**Results of research.** According to results of survey it was concluded that: the representatives of family *Moraceae* (on collection areas with unprotected soils) grow in all botanical gardens of Kyiv (Table. 1).

**1. Comparative marks of presence the representatives of the family  
Moraceae in ornamental plantings in Kyiv and in places with the  
largest species and forms presence in Ukraine.**

Species names	Species and form diversity of silk					
	In green decorative stands in Kyiv				In other places of widespread introduction in Ukraine	
	NBG of M.M. Gryshka	BotGarden of KNU of O.V. Fomina	BotGarden of NULES of Ukraine	Other plantings	National dendrology park "Sofiivka" of Uman city	Botanical garden "Nikitskyi"
<i>Morus australis</i> Poir.	-	+	-	-	-	-
<i>Morus alba</i> L.	+	+	+	+	+	+
<i>M. a.</i> 'Nana'	-	+	-	-	-	-
<i>M. a.</i> 'Pendula'	+	+	+	+	+	+
<i>M. a.</i> 'Macrophylla'	+	+	+	-	+	-
<i>M. a.</i> 'Globosa'	-	-	-	-	+	-
<i>M. a.</i> 'Contorta'	-	-	-	-	+	-
<i>M. a.</i> 'Piramidalis'	-	-	-	-	+	+
<i>M. a.</i> 'Tatarica'	-	-	-	-	+	-
<i>Maclura pomifera</i> (Raf.) C.K.Schneid.	+	+	-	-	+	+
<i>Broussonetia papyrifera</i> (L.) L'Herit.	+	+	+	-	+	+
<i>Cudrania tricuspidata</i> L.	-	+	-	-	-	+
<i>Ficus carica</i> L.	-	+	-	-	-	+

In the collection and in decorative urban plantations in Kyiv totally grow six species and three decorative cultivars, which belong to five genus of the *Moraceae*. By comparing the species and their form compositions of the representatives the family with other major centers of their cultivation (collection of National dendrology park "Sofiivka" (Uman city) and "Nikitskyi" botanical garden – National scientific center of NAAS Ukraine) it was found that the largest collection of mulberries is located in the Botanical garden of KNU. For its enrichment such cultivars considered to be perspective which are missing in the collection of *Morus alba* ( in a first case from "Sofiivka"), namely: *M. alba* 'Globosa', *M. alba* 'Contorta' (pic.1) which is

highly decorative for the case of winding sprouts, *M. alba* 'Piramidalis', *M. alba* 'Tatarica', *M. alba* 'Pendula' (pic.2).



Pic.1. *M. alba* 'Contorta'  
(National dendrology park)  
«Sofiivka» Uman city.  
june 2011 p.).



Pic.2. *M. alba* 'Pendula'  
(National dendrology park)  
«Sofiivka» Uman city.  
june 2011 p.).

As we know that intensive selective work takes place all over the world to increase the number of very valuable decorative plants which can be used for landscaping on different functional goal areas. As most decorative forms of plants in Ukraine go to customers through the activities of private companies, without previous introductory tests, before the botanical gardens appeared very crucial question of the development of modern approaches to their selection for the enrichment dendrological collections and to implement it to ornamental plantings. It is fully concerns family members of species complexes of Mulberries.

To acquaint oneself with the prospective for the use of cultivar woody garden plants the largest amount of information exists in the UK Royal Horticultural Society which was founded in 1804 and considered to be the premier organization of registration different sorts. (International Cultivar Registration Authorities) (ICRAs) (Table. 2) [7].

## 2. World diversity of different decorative forms and species on family *Moraceae* introduced To Ukraine

Species	Decorative cultivars of world selection (according to The Royal Horticultural Society (RHS))
<i>Morus australis</i>	Totally registered cultivars : 0
<i>Morus alba</i>	'Black Tabor', 'Bungeana', 'Chaparral', 'Fastigiata', 'Issai', 'Laciniata', 'Macrophylla', 'Middleton', 'Nana', 'Oscar', 'Pakistan', 'Paradise', 'Pendula', 'Platanifolia', 'Pompon', 'San Martin', 'Shangri-la', 'Venosa'. Totally registered cultivars : 18
<i>Maclura pomifera</i>	'Pretty Woman'. Totally registered cultivars: 1.
<i>Broussonetia papyrifera</i>	'Billardii', 'Cucullata', 'Laciniata', 'Leucocarpa', 'Macrophylla', 'Variegata'. Totally registered cultivars : 6
<i>Cudrania tricuspidata</i>	Totally registered cultivars : 0
<i>Ficus carica</i>	'Abicou', 'Adam', 'Alma', 'Angélique', 'Archipel', 'Beall', 'Bellone', 'Bifère', 'Black Ischia', 'Black Jack', 'Black Mission', 'Black Neck Lady', 'Bornholm', 'Boule d'Or', 'Bourjassotte Grise', 'Brogiotto', 'Brown Turkey', 'Brunswick', 'Califfo Blue', 'Castle Kennedy', 'Celeste', 'Col de Dame Blanc', 'Col de Dame Noir', 'Colummaro Black Apulia', 'Colummaro White Apulia', 'Conandria', 'Continental', 'Dalmatie', 'De Ley', 'Desert King', 'Digredo', 'Dorée de Porquerolles', 'Drap d'Or', 'Excel', 'Figue d'Or', 'Filacciano', 'Flanders', 'Goutte d'Or', 'Green Ischia', 'Green Sicilian', 'Grise de Marseille', 'Grise de Saint Jean', 'Grise Ronde', 'Grosse Grise', 'Ice Crystal', 'Jordan', 'Kaafe Bruin', 'Kadota', 'Lisa', 'Little Yellow Wonder', 'Longue d'Août', 'LSU Purple', 'Maellana Blanca', 'Malcolm's Giant', 'Malta', 'Marseillaise', 'Melanzana', 'Monstreuse', 'Morena', 'Moscatel', 'Napolitana', 'Nazaret', 'Neck Lady White', 'Negréte de Porquerolles', 'Negro Largo', 'Nero', 'Nero del Portogallo', 'Newlyn Coombe', 'Noire de Caromb', 'Osborn's Prolific', 'Panachée', 'Pastilière', 'Peter's Honey', 'Petite Grise', 'Petite Nigra', 'Pied de Boeuf', 'Pinet', 'Pittaluse', 'Porthminster', 'Précoce de Dalmatie', 'Précoce Ronde de Bordeaux', 'Quinta', 'Reculver', 'Ronde de Bordeaux', 'Rouge de Bordeaux', 'Safi', 'Saint Johns', 'San Pedro Miro', 'Snowden', 'Solles Pont', 'Sugar 12', 'Sultane', 'Tena', 'Texas Everbearing', 'Troiano', 'Trojano', 'Verte d'Argenteuil', 'Violetta', 'Violette Dauphine', 'Violette de Bordeaux', 'Violette de Solles', 'Violette Normande', 'Violette Sepor', 'White Adriatic', 'White Ischia', 'White Marseilles', 'Zidi'. Totally registered cultivars : 107

On a base of analyses well known in the world decorative cultivars species of *Moraceae* we can see, that in Ukraine it have been already tested certain part of famous world representatives of genus *Morus alba*. Results of the research showed on the significant inroductional potential of genus *Morus*, *Broussonetia*, *Ficus*.

For the selection with the goal of research and widespread implementation of new cultivars it is compulsory to provide monitoring of global and domestic markets of decorative plants for the selection, testing and using in Ukraine the most perspective forms.

The photo analyses of the green stands that took place during the inventory research showed on perspectives of widespread implementation of all present in Ukraine cultivars of family *Moraceae* to urban green decorative stands of different functional purpose. (Table. 3).

### 3. Perspectives use species from family *Moraceae* in different types of green urban decorative plantations

Plantation type	Type of planting					
	Isolated trees	curtain	group	array	Lines planting, alleys	hedge
Planting along the streets, squares, parks, alleys.	1-6	1-6	1-6	2	1-3	1, 2
Planting near child care centers, health centers, etc.	1, 2, 4	-	1, 2, 4	2	1, 2	1, 2
Industry panting	2-5	2	1-5	1, 2	1, 2	1, 2
Recreational and cultural	1-6	1-6	1-6	1, 2	1, 2, 4	1, 2
Forest type parks	1	-	1	1	-	1, 2

Annotation Investigated species of the family *Moraceae*: 1 – *Morus australis*; 2 – *Morus alba*; 3 – *Maclura pomifera*; 4 – *Broussonetia papyrifera*; 5 – *Cudrania tricuspidata*; 6 – *Ficus carica*.

The use of the representatives of the family *Moraceae* in plantations in the public use places considered to be perspective and should attract more attention, because of ecological properties and they are gas resistant, dust resistant, drought resistant and stable to strong frosts [1,2], they can easily adapt to new environmental conditions. Most of the species considered to be very valuable from decorative point of view and not very common for use in landscaping. *Broussonetia papyrifera* — decorative by the shape, structure of leaves and bright flowers during the blossoming (pic.3), *Cudrania tricuspidata* and *Maclura pomifera* – by its fruits (pic.4).



Pic.3. *Broussonetia papyrifera* (L.)  
L'Herit. While blessing.



Pic.4. *Maclura pomifera* Schneid.  
(fruits).

For use in landscaping of urban environment it is important to pay attention to the male specimens *Morus alba*, first of all because of sanitary - hygienic point of view.

## CONCLUSIONS

1. The representatives of family *Moraceae* are highly presented in collections in Botanical garden of O.V. Fomina (KNU of Tarasa Shevchenka). Mulberries are presented by six species and three decorative its forms, that belong to five genus: (*Morus*, *Maclura*, *Broussonetia*, *Cudrania*, *Ficus*).

2. Enrichment the collection of mulberries in Kyiv is appropriate to perform on the primary throw searching and introduction new ornamental cultivars from all branches of their cultivation in Ukraine. New and the most perspective for research considered to be next cultivars: *Morus alba* 'Globosa', *M. a.* 'Contorta', *M. a.* 'Piramidalis', *M. a.* 'Tatarica'. The results of world study about assortment of cultivars introduced in Ukraine of all species from family *Moraceae* indicate on a huge potential of introduced representatives of family complexes *Morus*, *Broussonetia*, *Ficus* to Ukraine with the goal to widespread them in ornamental planting.

3. The use of all representatives of the family *Moraceae* in plantations areas for public use considered to be perspective and deserves more attention to itself, especially to create alleys, groups, individual planting, and also to create hedges.

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## АНАЛІЗ ТАКСОНОМІЧНОГО СКЛАДУ РОДИНИ MORACEAE LINDL. В БОТАНІЧНИХ САДАХ МІСТА КИЄВА ТА ПЕРСПЕКТИВИ ЙОГО ЗБАГАЧЕННЯ

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Проведено інвентаризацію та визначення таксономічного складу представників родини шовковицевих (*Moraceae* Lindl.) у колекційних насадженнях ботанічних садів м. Києва. На основі порівняльного аналізу, з'ясовано можливості збагачення обстежених колекцій новими видами та культиварами для широкого впровадження їх у декоративні насадження загального користування.



*Ключові слова: родина Moraceae, таксономічний склад, ботанічні сади, декоративні насадження, культивари.*

**АНАЛИЗ ТАКСОНОМИЧЕСКОГО СОСТАВА СЕМЕЙСТВА MORACEAE  
LINDL. В БОТАНИЧЕСКИХ САДАХ ГОРОДА КИЕВА И  
ПЕРСПЕКТИВЫ ЕГО ОБОГАЩЕНИЯ**

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Произведена инвентаризация и определение таксономического состава представителей семейства шелковичных (Moraceae Lindl) в коллекционных насаждениях ботанических садов г. Киева. На основе сравнительного анализа, выяснены возможности обогащения обследованных коллекций новыми видами и декоративными формами для широкого внедрения их в декоративные насаждения общего пользования.

*Ключевые слова: семейство Moraceae, таксономический состав, ботанические сады, декоративные насаждения, культивары.*