

Short communication

Introduction of species of the *Juglans* genus in the West of Ukraine

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Abstract

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This article is dealing with occurrence of species of the genus *Juglans* L. in 36 woodland subjects in the Western Ukraine: old parks, arboretums, forests and artificial plantations. We evaluate the tree age, growth (height, $d_{1,3}$ diameter), abundance (tree number), fecundity and germination capacity. The most frequently cultivated species is *Juglans nigra* L. (21 subjects), the most rare are *Juglans cordiformis* Maxim. and *Juglans manshurica* Maxim. (in 3 subjects each). The cultivated *Juglans* trees are the most abundant in the Precarpathian region Opollya (24 subjects).

Key words

Introduction of woody plants, *Juglans*, West of Ukraine, fecundity, germination rate

Introduction

The *Juglans* genus is a walnut which belongs to tribus Juglandae of subfamilia Juglandoideae of familia Juglandaceae of ordo Juglandales in subclassis Hamamelidales of classis Magnoliopsida of divisio Magnoliophyta (MANNING, 1948; TAHTADJAN, 1987).

There are very different opinions as for the species number belonging to the *Juglans* (walnut) genus, ranging between 21 (MANNING, 1948) and 44 (DODE, 1909). Walnut trees prefer moderate, subtropical and tropical regions of the northern hemisphere and they can also be found in the Andes and Brazil in the southern hemisphere. Almost always they grow in mountain localities in broadleaved and mixed forest stands (SOKOLOV, 1951).

By structure of the fruits (DODE, 1909), the *Juglans* species can be specified in sections: *Dioscaryon*, *Cardiocaryon*, *Rhysocaryon* and *Trachycaryon*, by structure of the flowers (MANNING, 1948) we differentiate among: *Juglans*, *Cardiocaryon*, *Rhysocaryon* and *Trachycaryon*. By structure of the pollen grains (KUPRIANOVA, 1965) we distinguish among four subtypes: *Regia*, *Cinerea*, *Mollis* and *Australis*.

Material and methods

The research objects were species of *Juglans* L. genus growing in old parks, arboretums, forests and artificial plantations; the localities have been labelled according to preliminary zoning of the Ukrainian Carpathians and Western Podollya (TERMENA et al., 2004). The approximate age of walnut trees was assessed visually and on the background of the documentation on the parks. The taxation indexes were determined by methods commonly recognised for taxation. The tree number was expressed categorically, using the following scale: less than six (the exact number), several (S) – 6–20 trees, many (M) – 21–50 trees, very many (VM) – more than 50 trees. The fecundity was assessed visually, using the 6-point scale by KORCHAGIN (1960): 0 – no fruits, 1 – very low production, 2 – low production, 3 – satisfactory production, 4 – good production, 5 – very good production; figures in brackets express duration of the study in years. The germination capacity of seeds was specified according to GOST 13056.8-68 (ANONYMUS, 1968).

Results

There exists a century-old experience with introduction of a number of *Juglans* species in territory of Western Ukraine from their domestic regions in Iran-Turan (*J. regia* L.), East Asia (*J. ailantifolia* Carr., *J. cordiformis* Maxim., *J. manshurica* Maxim.), North America (*J. nigra* L., *J. cinerea* L.), and Rocky Mountains (*J. rupestris* Engelm.) (TAHTADJAN, 1974).

POCORNÝ (1864) summarising the experience with introduction of alien woody plants noted that *J. regia* had already been growing wild across the territory of Bukovina. By the end of the 19th century, different walnut species, *J. nigra* (ANONYMUS, 1899) and *J. cinerea* (WILLKOM, 1975) in particular, appeared spontaneously in several localities.

Table 1. Genus *Juglans* species in Western regions of Ukraine

Place of growth	Age, years	Maximum size		Tree number*	Fecundity* (years of observation)	Germination capacity, %
		Height, m	Diameter, cm			
Section <i>Cardiocaryon</i> Dode et Mann., subtype <i>Cinerea</i> Kuprian. – <i>J. ailantifolia</i> Carr.						
8	50	14	46	2	2.5 (10)	89.6–92.9
11	40	12	28	4	2.7 (12)	92.8–98.4
12	20	8	24	S	2.3 (3)	–
24	60	14	36	1	2.7 (3)	–
<i>J. cordiformis</i> Maxim.						
11	40	15	28	4	2.7 (16)	80.5–91.2
15	30	12	24	S	2.5 (1)	73.3
19	20	8	12	2	2.5 (3)	–
<i>J. manshurica</i> Maxim.						
11	40	20	40	2	2.6 (8)	93.6–100.0
32	20	8	16	M	2.5 (3)	–
34	20	6	16	VM	2.5 (3)	–
Section <i>Dioscaryon</i> Dode, <i>Juglans</i> Mann., subtype <i>Regia</i> Kuprian. – <i>J. regia</i> L.						
4	80	16	48	1	2.7 (10)	92.3–100.0
7	80	15	80	S	2.8 (3)	–
10	60	14	40	S	2.3 (1)	87.7
11	50	17	42	3	2.7 (16)	87.0–95.2
27	25	8	28	S	2.3 (3)	–
30	80	20	100	M	2.6 (12)	89.4–100.0
33	30	10	32	VM	2.6 (3)	–
35	20	7	24	VM	2.5 (3)	85.4–98.1
36	60	12	46	S	2.5 (8)	–
Section <i>Rhysocaryon</i> Dode et Mann., subtype <i>Mollis</i> Kuprian. – <i>J. nigra</i> L.						
4	30	10	20	2	2.5 (5)	–
1	120	22	40	1	2.5 (5)	94.8–100.0
5	100	24	80	S	2.8 (8)	100.0
9	120	24	60	1	2.3 (8)	–
2	140	18	100	1	2.7 (8)	100.0
3	100	20	80	1	2.5 (8)	100.0
6	40	12	40	3	2.5 (8)	–
10	30	10	22	M	2.0 (8)	–
14	80	28	96	1	2.5 (5)	–

Table 1. Continued

Place of growth	Age, years	Maximum size		Tree number*	Fecundity* (years of observation)	Germination capacity, %
		Height, m	Diameter, cm			
13	120	30	84	1	3.0 (1)	89.4
17	100	24	48	1	2.5 (3)	
36	120	20	104	1	2.5 (8)	93.7–100.0
11	100	35	84	2	2.6 (16)	92.3–97.6
16	80	20	42	1	2.3 (10)	76.3–90.0
20	80	18	48	S	2.5 (5)	100.0
22	80	18	56	1	2.5 (3)	–
28	80	16	56	2	2.5 (1)	93.4
29	80	20	46	S	2.7 (5)	100.0
31	100	29	84	1	2.6 (5)	–
Section <i>Trachycarion</i> Dode et Mann., subtype <i>Cinerea</i> Kuprian. – <i>J. cinerea</i> L.						
11	90	18	46	2	2.8 (8)	–
13	120	20	60	1	2.3 (5)	–
17	80	16	42	2	2.5 (1)	93.7
18	100	17	64	S	2.5 (8)	–
19	20	8	12	3	2.0 (3)	–
21	20	5	12	S	2.0 (8)	–
23	90	16	80	1	2.9 (1)	89.1
24	140	26	84	1	2.6 (3)	80.6–100.0
25	70	15	70	1	2.6 (3)	–
26	120	18	80	1	2.7 (10)	95.2–100.0

*See Material and methods.

Transcarpathian lowland introduction district. Parks: 1 – hospitals in the town of Beregovo, 2 – Horkyi Park in the town of Vynogradiv, 3 – Kinderhouse # 3 in the town of Vinogradiv.

Transcarpathian foothills introduction district. Arboretums: 4 – Botanical Gardens of the Uzhorod State University. Parks: 5 – the township of Bushtyno, 6 – Druzhba Park in the town of Hust, 7 – the village of Ruskoe pole.

Carpathian mountain introduction district. Parks: 8 – park zone in the town of Kosiv, 9 – the town of Rahiv, 10 – the township of Velykyi Berezhnyi.

Opollya-Precarpathian introduction district. Arboretums: 11 – Botanical Gardens of the Chernivtsi National University, 12 – Hermakivka forestry office, 13 – Lviv Forestry University, 14 – Botanical Gardens of the Lviv National University, 15 – Storozhynets Forestry College. Parks: 16 – hospital of the town of Berehomet, 17 – the town of Bolehiv, 18 – the village of Cherlenivka, 19 – Chernivtsi National University, 20 – Hlyboka district hospital, 21 – school in the village Hrushivtsy, 22 – the old-aged house in the village

of Petrychanka, 23 – the Vashkivtsi branch of Chernivtsi regional research agricultural station, 24 – Vyshnianskyi agricultural college, 25 – Vyzhnytsya district hospital, 26 – Sad-Hora children's tuberculosis sanatorium, 27 – the children's tuberculosis sanatorium in the village of Stara Zhadova, 28 – the technical school in the village of Stavchany, 29 – boarding school in the town of Storozhynets. Plantations: 30 – the city of Chernivtsi, 31 – the village of Yablunivka. Woodlands: 33 – the village of Izheshtsk, 36 – the village of Klishkivtsi, 37 – the village of Slavtsi, 33 – the village of Valia Kuzmin.

Western-Podolian introduction district. Parks: 16 – the village of Skala Podilska.

The top qualities of walnut trees such as the high growth rate, high longevity, wide ecological amplitude and strong adaptive capacity ensured them a wide expanding distribution range. The experience with introduction of Juglans trees into the western part of Ukraine is of a great theoretical and practical importance in context of expanding cultural areas of precious wood species.

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Introdukcia druhov rodu *Juglans* v západnej Ukrajine

Súhrn

Zhodnocuje sa zastúpenie druhov rodu *Juglans* v 36 dendrologických objektoch západnej Ukrajiny. Vyhodnocuje sa vek, rast (výška, hrúbka $d_{1,3}$), početnosť, plodnosť a kvalita semena (klíčivosť). Najviac pestovaným druhom je *Juglans nigra* L. (21 objektov), najmenej *Juglans cordiformis* Maxim. a *Juglans manshurica* Maxim. (po 3 objekty). Najrozšírenejšou oblasťou pestovania druhov rodu *Juglans* v západnej Ukrajine je zakarpatský región Opollya (24 objektov).