

# Morphological and biochemical characterization of fruits from Common persimmon (*Diospyros virginiana* L.) widespread seedlings

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## INTRODUCTION

Species of genus *Diospyros* belong to an extensive class of family Ebenaceae consisting of 7 genera. Yonemori et al. (2000) listed over 400 species forming the *Diospyros* genus and several of these species are of economic importance.

*D. virginiana* is native to the eastern United States, ranging from Connecticut to southern Florida, westward to east Texas and southeastern Kansas (Holdeman, 1998). Fruits can be used in the food processing industry. It is also used as a rootstock for Date plum grown in low temperature conditions.

## AIM

The aim of this work was evaluation of selected morphological and biochemical traits on 15 genotypes of Common persimmon grown in various localities of Europe.

## MATERIAL AND METHODS

For experiments, we evaluated three cultivars of USA provenance (Weber, John Rick and Meader) which grew in Kyiv, Ukraine; one Ukrainian cultivar grew in Kyiv (Spacenko); six genotypes grew from seedlings in Kyiv (KY-01 to -06); two genotypes grew in Nova Kachovka, Ukraine (NK-01-02); one genotype grew in the botanical garden in Budapest, Hungary (BU-01) and one genotype grew in the arboretum in Mlynany, Slovakia (AM-01). We evaluated 50 technologically matured fruits from each genotype in 2011. For fruits, we evaluated weight (g), height and width (mm), number of seeds and other traits. We evaluated content of amino acids, content of macro- and micro-elements in fruit flesh, leaves and calyx. By the DPPH method, we evaluated antioxidant activity of fruit flesh in both methanolic and aqueous extracts.

## RESULTS

We evaluated the weight of fruits ranging from 3.78 g (AM-01) to 66.02 g (NK-03). Protein content ranged from 33.2 g.kg<sup>-1</sup> (fruits) to 218.4 g.kg<sup>-1</sup> (calyx). Fruits, seeds and calyx are characterised by higher content of valine, leucine, lysine, glutamine and arginine. We determined high content of calcium in leaves and fruits (37.635/2.027 g.kg<sup>-1</sup>), potassium (19.65/8.81 g.kg<sup>-1</sup>) and magnesium (2.63/1.23 g.kg<sup>-1</sup>). We determined antioxidation activity of fruit flesh in aqueous/methanolic extract ranging from 52.47/51.13% to 91.48/93.66%. Results show, that Common persimmon is a prospective species for spreading and use in many countries of Central and Eastern Europe.

**Table 1** Variability of fruits weight (g) and seeds weight from widespread genotypes of Common persimmon (*Diospyros virginiana* L.)

Genotype	Fruit weight (g)					Seed weight (g)				
	Min	Max	Mean	Sx	V%	Min	Max	Mean	Sx	V%
1 Meader (USA)	12.38	70.30	37.71	17.97	47.65	0.40	0.80	0.59	0.13	22.15
2 John Rick (USA)	53.30	75.30	61.92	6.25	10.09	0.30	0.80	0.62	0.14	23.75
3 DV-KY-01 (UA)	51.80	71.90	62.02	6.44	10.38	0.30	1.00	0.74	0.22	30.12
4 DV-KY-02(UA)	57.70	74.10	64.65	5.12	7.92	0.50	0.80	0.67	0.10	16.12
5 DV-KY-03(UA)	28.60	52.30	42.44	7.57	17.85	0.30	0.70	0.51	0.11	22.89
6 DV-KY-04(UA)	36.20	46.0	39.73	3.59	9.05	0.40	0.60	0.50	0.07	15.11
7 DV-NK-01(UA)	13.60	23.0	18.67	2.40	12.88	0.30	0.50	0.39	0.06	16.32
8 DV-NK-02(UA)	19.20	31.0	25.50	3.52	13.82	0.50	0.70	0.60	0.06	10.05
9 DV-NK-03(UA)	51.80	80.30	66.02	9.13	13.83	0.30	0.70	0.51	0.10	21.37
10 DV-KY-05(UA)	14.30	21.50	17.86	2.26	12.68	0.46	0.64	0.55	0.06	11.41
11 DV-KY-06(UA)	5.10	18.90	12.26	3.58	29.23	0.30	0.70	0.55	0.10	19.41
12 Spacenko (UA)	19.70	39.10	30.74	4.73	15.38	0.60	1.00	0.78	0.10	14.04
13 DV-BU-01(HU)	13.82	18.31	15.57	1.42	9.16	1.26	2.45	1.81	0.35	19.62
14 DV-AM-01(SK)	1.40	6.10	3.78	1.48	39.19	0.06	0.17	0.12	0.03	28.52
15 Veber (USA)	9.48	27.54	19.71	5.33	27.06	0.48	0.67	0.56	0.05	9.51

**Legend:** Min – the minimum value; Max – the maximum value; Mean – Arithmetic mean; Sx – Standard error; V% – coefficient of variation %

**Table 2** Content of proteins, essential and non-essential aminoacids in fruits, leaves, calixes and seeds (g.kg<sup>-1</sup>) of Common persimmon (*Diospyros virginiana* L.)

	Leaves ♀	Calix ♀	Seed	Fruit
<b>Proteins</b>	132.6	218.4	128.1	33.2
<b>Content of essential amino acids</b>				
Isoleucine	5.8	5.9	1.5	0.7
Leucine	10.1	9.6	2.4	1.0
Lysine	7.2	6.5	2.3	0.8
Phenylalanin	6.6	5.8	1.6	0.7
Treonin	4.4	4.8	1.5	0.7
Tryptophan	2.3	1.3	<0.01	0.6
Valine	8.1	8.4	2.2	1.0
<b>Content of non-essential amino acids</b>				
Alanine	6.8	7.3	1.9	0.8
Arginine	12.3	5.5	3.5	2.1
Aspartic acid	10.0	11.3	3.1	1.4
Glutamic acid	17.4	12.6	5.6	1.4
Glycine	6.8	6.5	2.0	0.8
Histidine	4.5	23.5	2.3	1.1
Proline	7.8	8.5	2.0	<0.1
Serine	2.6	3.6	1.1	0.4
Tyrosine	3.3	3.4	0.6	<0.1

## CONCLUSIONS

Leaves and of shoots are important products, which could be utilized as resources of biologically active substances for pharmaceutical products.

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**Table 3** Content of macro- and micro-elements in solid from leaves, offspring of Common persimmon (*Diospyros virginiana* L.)

	Leaves		Offspring		Calix ♀	Fruit
	♀	♂	♀	♂		
<b>P</b> Phosphorous	1850	3225	1320	1488	790	1180
<b>K</b> Potassium	19656	17878	5802	4276	8356	8814
<b>Ca</b> Calcium	37635	7882	10338	13657	18742	2027
<b>Mg</b> Magnesium	2637	3227	1363	1873	1835	1237
<b>Na</b> Sodium	29	22,4	58,3	67,21	36	25,1
<b>S</b> Sulfur	2315	2865	390	410	805	210
<b>Fe</b> Ferrum	163	151	50,3	52,5	32,7	253
<b>Mn</b> Manganese	86,5	41,1	59,7	22,1	21,4	131
<b>Zn</b> Zinc	35,5	50,2	7,9	9,5	1,7	25
<b>Cu</b> Copper	3,3	5,8	89	67	53	1106
<b>Solid %</b>	93,56	92,10	91,18	92,54	91,89	92,90



**Figure 1** Variability of male/female (LEFT/RIGHT) flowers of Common persimmon



**Figure 2** Variability of fruit shapes of Common persimmon (*Diospyros virginiana* L.)



**Figure 3** Variability of seed shapes of Common persimmon (*Diospyros virginiana* L.)