

CARACTERISTICI ALE SOIURILOR DE NUC DIN ZONA DE NORD EST A ROMÂNIEI

CHARACTERISTICS OF WALNUT TREE CULTIVARS FROM NORTH - EASTERN AREA OF ROMANIA

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Abstract

Research was conducted during 2012 - 2016 at 13 walnut tree cultivars from experimental plot existing in Research Station for Fruit Growing Iași, Romania. Observations and determinations concerning the trees' vigour through trunk cross-sectional area (cm²), trees' height (cm), 1-year shoots length (cm) and the number of shoots per tree (items) have been done. In the 6th year after planting TCSA values range between 10.93 cm² ('Sibișel') and 40.40 cm² ('Miroslava') with average 23.14 cm². The length of young shoots increased in the 5th and 6th year after planting, average being 72.45 cm and respectively 72.93 cm. In the 6th year after planting tree height range between 175.4 cm ('Sibișel') to 321.4 cm ('Velnița').

Cuvinte cheie: nuc, soi, pom, lungime ramuri, secțiunea trunchiului.

Key words: walnut, cultivar, tree, shoots length, trunk.

1. Introduction

The walnut crop has a long tradition on the Romanian territory and it has the advantage of producing fruits with an high potential for capitalization, taking into consideration the high prices and the increasing demands of the international market (Botu and Achim, 2001; Cociu, 2007). The *Juglans regia* L. species can be found in Romania spread all over the country as frequently cultivated or spontaneous plants (Ciocârlan, 2000). In 2014 in Romania the harvest area was 1,598 ha with 19.72 tonnes/ha fruits production (FAOSTAT data).

Of total orchards 58% are more than 25 years old plantations with 100 trees/ha density and 42% are young plantations with more than 160 trees/ha density (Chitu and Coman, 2014). The main walnut tree cultivars in Romanian are 'Germisara', 'Jupânești', 'Sibișel', 'Miroslava' and 'Velnița' but mostly planted on their roots and just a few plantations are established by grafted on seedlings *J. regia* L. as rootstocks. In the last ten years by a National Programme for renewing local fruit growing, new cultivars were introduced in plantations but almost all grafted on *J. regia* L. genotypes as rootstocks, these being suitable for high density orchards and with more homogeneity than the walnut tree on own roots (Prunet and Verhaeghe, 2011). This paper aims to assess 13 walnut cultivars which are suitable as mother plants for nurseries or plant material for orchards.

The paper presents aspects concerning the tree vigor and 1-years-shoots growth recorded during 2012-2017 over the growing of the trees for some autochthonous and foreign walnut cultivars, in the NE area of Romania climate conditions.

2. Material and methods

Research was conducted during 2012-2016 at 13 walnut tree cultivars from experimental plot existing in Research Station for Fruit Growing Iași, Romania. The plantation is placed in the Jijia-Bahlui basin and the soil is typical cambic with a great depth of the groundwater (10 m). The area is characterized by a multiannual average temperature of 10.5°C (average on 15 years) and the multiannual rainfall of 518 mm. The walnut trees are grafted on *Juglans regia* L. as seedlings rootstock and planted at a distance of 8 x 10 m without irrigation system. On the row with trees the soil was worked with the lateral disk with feeler and between the trees rows the soil was heated. Observations and determinations concerning the trees' vigour (trunk cross-sectional area, cm²), trees' height (cm), 1-year shoots length (cm) and the number of shoots per tree (items) have been done. Trunk cross-sectional area (TCSA) was calculated from the trunk diameter measured at 15 cm height above the graft union during dormant period in each study year with a digital caliper (Luomytools). Trunk vegetative growth (cm²) was obtained from the difference in TCSA between study years. The trees' height and the 1-year shoots length was determined by measurement.

The experimental data was statistically expressed by analysis of the standard deviation and covariance utilizing the Microsoft Excel software.

3. Results and discussions

Trunk cross-sectional area of walnut tree registered differences between cultivars and study year (table 1). In the 2nd year after planting TCSA values range between 0.66 cm² ('Ovidiu') and 3.70 cm² ('Codrene') with average 2.40 cm². In the 5th year after planting TCSA values range between 8.11 cm² ('Geoagiu 65') and 32.71 cm² ('Miroslava') with average 17.36 cm², but in the 6th year after planting TCSA values range between 10.93 cm² ('Sibişel') and 40.40 cm² ('Miroslava') with average 23.14 cm². Trunk vegetative growth increased in the 5th year after planting with 14.96 cm² and in the 6th year after planting with 20.75 cm² as average of all studied walnut cultivars (table 1). The minimum value of trunk vegetative growth in the 5th year after planting registered 'Geoagiu 65' but the maximum value was 30.01 cm² at 'Miroslava'. The trunk vegetative growth in the 6th year after planting registered a minimum value as 9.92 cm² at 'Sibişel' and a maximum value as 37.72 cm² at again 'Miroslava' (table 1). Trunk cross-sectional area differs between walnut cultivars, on rootstocks versus own rooted trees or applied technologies. So, Hasey et al., 2004 showed TCSA in the 5th year after planting 90 cm² as average value at 'Chandler' on 'Paradox' as seedlings rootstock and irrigation applied. Compared with our data, we registered a maximum 32.71 cm² ('Miroslava') but without irrigation and grafted on *Juglans regia* L. as seedlings rootstock. Nevertheless, Botu et al., 2007 specified that in the 4th year after planting the growth rate increased and in the 9th year they recorded values between 89 cm² ('Pedro') and 224 cm² ('Serr') in the non-irrigated field conditions.

1-year shoots length of the all walnut cultivars taken into study registered in second year after planting 29.30 cm as average (table 2) and values range between 14 cm ('Recea') to 44.5 cm ('Sibişel'). The length of young shoots increased in the 5th and 6th year after planting, average being 72.45 cm and respectively 72.93 cm. In the 5th year after planting the shortest young shoots registered 'Geoagiu 65' with 48.75 cm but the longest 1-year shoots was at 'Miroslava' with 93 cm. Differences between 2nd year after planting and 6th year range from 5.97 cm ('Sibişel') to 86.86 cm ('Miroslava').

The tree height data of walnut cultivars studied were presented in table 3. In the 5th year after planting data recorded range between 149.56 cm ('Germisara') to 276.14 cm ('Velnița'). In the 6th year after planting tree height range between 175.4 cm ('Sibişel') to 321.4 cm ('Velnița'). Differences between 5th and 6th range from 7 cm ('Miroslava') (figure 3) to 53.67 cm ('Ovidiu') with an average 29.23 cm. The tree height of walnut cultivars is an important features having influences for establish the density in the orchards.

By correlating the TCSA with 1-year shoots length it was observed that these variables are very significant positively correlated (figure 1) with correlation index 0.5273. Also, correlating the TCSA with tree height it was observed that these variables are very significant positively correlated (figure 2) with correlation index 0.8512.

4. Conclusions

Trunk cross-sectional area, young shoots and tree height have highly increased in the 5th and 6th year after planting.

'Miroslava' is a walnut cultivar with great tree vigor while 'Velnița' has a great tree height.

Trunk cross-sectional area of walnut cultivars is very significant positively correlated with young shoots length and tree height.

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Tables

Table 1. Trunk cross-sectional area of walnut tree cultivars (RSFG Iași, 2012-2016)

Cultivar	Trunk cross-sectional area/ year (cm ²)			Trunk vegetative growth (5 th year after planting) (cm ²)	Trunk vegetative growth (6 th year after planting) (cm ²)
	2012 (2 nd year after planting)	2015 (5 th year after planting)	2016 (6 th year after planting)		
Geoagiu 65	2.37	8.11	15.54	5.74	13.17
Germisara	1.14	12.92	16.71	11.78	15.57
Sibișel	1.01	9.81	10.93	8.8	9.92
Jupânești	2.87	11.83	17.11	8.96	14.24
Codrene	3.70	16.44	24.92	12.74	21.22
Fălești	3.57	25.71	30.21	22.14	26.64
Recea	1.68	18.00	24.60	16.32	22.92
Schinoasa	3.68	19.41	25.30	15.73	21.62
Danirenko	3.16	17.20	23.91	14.04	20.75
Miroslava	2.70	32.71	40.42	30.01	37.72
Velnița	2.7	32.7	40.4	30	37.7
Anica	1.90	11.63	19.51	9.73	17.61
Ovidiu	0.66	9.18	11.31	8.52	10.65
Average	2.40	17.36	23.14	14.96	20.75
STDEV	1.04	8.36	9.55	7.91	8.99
COVAR	43.44	48.17	41.27	52.85	43.37

Table 2. 1-year shoots length of walnut cultivars (RSFG Iași, 2012-2016)

Cultivar	1-year shoots length /Year (cm)			Differences between 2012 to 2016 (cm)
	2012	2015	2016	
Geoagiu 65	33	48.75	65.36	32.36
Germisara	34	56.52	61.6	27.6
Sibișel	44.5	76.17	50.47	5.97
Jupânești	22	78.96	59.2	37.2
Codrene	25	80.74	79	54
Fălești	31.4	67.23	65.61	34.21
Recea	14	71.39	71.2	57.2
Schinoasa	21.86	72.86	70.5	48.64
Danirenko	39.18	77.96	83.3	44.12
Miroslava	19.44	93	106.3	86.86
Velnița	34.25	77.26	94.13	59.88
Anica	36.5	72.37	70.44	33.94
Ovidiu	27	68.6	71	44
Average	29.3	72.45	72.93	43.54
STDEV	8.70	11.03	14.88	19.31
COVAR	29.61	15.22	20.41	44.36

Table 3. Tree height of walnut cultivars (RSFG Iași, 2015-2016)

Cultivar	Tree height /year (cm)		Differences between 2015 to 2016 (cm)
	2015	2016	
Geoagiu 65	157.89	183.00	25.11
Germisara	149.56	201.80	52.24
Sibișel	161.25	175.40	14.15
Jupânești	193.40	213.75	20.35
Codrene	230.11	280.20	50.09
Fălești	199.00	228.00	29.00
Recea	231.71	246.40	14.69
Schinoasa	208	222.50	14.5
Danirenko	206.63	222.80	16.18
Miroslava	236.00	243.00	7.00
Velnița	276.14	321.40	45.26
Anica	191.00	228.70	37.70
Ovidiu	166.33	220.00	53.67
Average	200.54	229.77	29.23
STDEV	36.73	38.49	16.60
COVAR	18.32	16.75	56.80

Figures

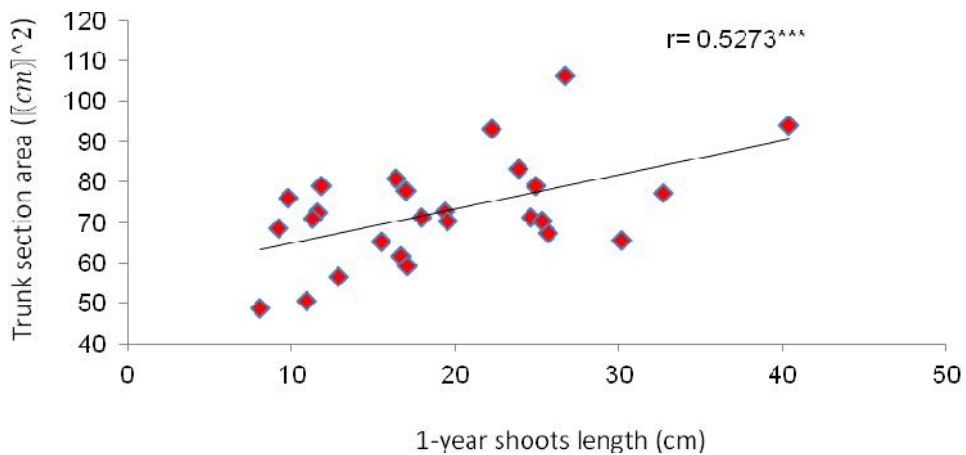


Fig. 1. Correlation between trunk cross-sectional area and 1-year shoots length of walnut cultivars

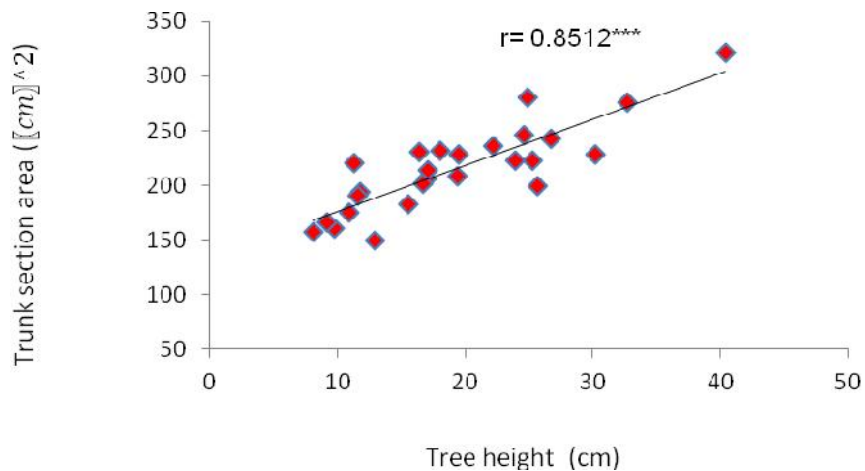


Fig. 2. Correlation between trunk cross-sectional area and tree height of walnut cultivars



Fig. 3. Tree height of 'Miroslava' walnut cultivar (RSFG Iasi, Romania, October 2015)