CERCETĂRI PRIVIND COMPORTAREA UNOR BIOSISTEME ALTOI-PORTALTOI ÎN PROCESUL DE CREŞTERE LA UNELE SOIURI DE PRUN

RESEARCH CONCERNING THE BEHAVIOUR OF SOME GRAFT/ROOTSTOCK BIO-SYSTEMS IN THE GROWING PROCESS OF SOME PLUM CULTIVARS

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Abstract

This paper highlights the way of behaviour in the growing process of some plum varieties grafted on various rootstocks as part of a plantation located nearby the city of Craiova. Research was carried out on three plum varieties during 2010-2012 – 'Renclod Althan', 'Alina' and 'Valor'-grafted on 3 rootstocks – 'Oteşani 8', 'Pixy' and 'Miroval', looking at the surface of the trunk's section ,the diameter of the crown, the volume of the crown, the height of the trees and the extent to which the land was occupied. The findings from the conducted study indicate that the 'Miroval' rootstock imprints the studied plum varieties the biggest growth vigour, being followed by the 'Pixy' rootstock, while the 'Oteşani 8' rootstock imprints the lowest vigour.

Cuvinte cheie: altoi, portaltoi,soi
Keywords: graft, rootstock, variety

1. Introduction

The ecological conditions extremely favorable for the plum growth allow the extinction of new varieties, recently created in our country or introduced from abroad. By applying correctly the culture technologies, large and constant productions can be obtained to satisfy the needs of domestic consumption and to ensure reserves for export.

The plums are appreciated for consumption fresh, dehydrated (dried plums) and processed as jams, marmalades, comfiture, compotes, jellies, liqueurs, brandy, candied or pickled fruits; they can be better preserved by refrigeration than other stone fruits , especially in syrup.

2. Material and methods

The research was conducted on a plantation placed near the city of Craiova, in 2010-2012,the biologic material being constituted by three plum cultivars – 'Renclod Althan', 'Alina' and 'Valor' - grafted on three rootstocks – 'Oteşani 8', 'Pixy' and 'Miroval'.

The plantation was established in 2000, on reddish preluvosoil poorly pseudo-gleyed, each rootstock was represented by 10 repetitions and the experiment was carried out using the method of randomized blocks.

The plantation distance was 4.0/4.0 m and the trees were trained according to improved vessel mode. The soil presented a weak acid reaction on the whole depth of the soil profile, the pH value varying from 5.50 to 6.64.

The humus content was 2.35% on the surface and lowered gradually on the profile to the value of 0.78%, the soil was, therefore, middle to poor supplied.

The area has a temperate continental climate with a small Mediterranean influence, enough precipitations but uneven allocated during the year, dry summers and the maximum of rainfall at the end of spring- beginning of summer (May and June).

The average annual temperature, during the three years of research, exceeded the value of the normal temperature in 48 years, on average with 0.1°C, recording positive deviations in May, June, July, August and December, respectively negative deviations in January, February, March, April, September and October (Table1).

The average annual precipitations recorded during the research period had the value of 669.6 mm, exceeding the normal in 48 years with 84.2 mm, but their distribution over years and months was uneven (August 2010-29,2 mm precipitations) (Table 2). Positive deviations from the normal were recorded in February, March, April, May, June, July, October, while in January, August, September and November the deviations were negative. All 10 trees in repetition, within each cultivar, grafted on the three rootstocks, were carried out the following biometric measurements: circumference of the trunk, height of the trunk, height of the tree and the diameter of the crown, not only between rows but also between trees

on the row. Based on this were calculated the average values of the trunk section's surface, diameter of the crown, volume of the crown, height of the trees and the extent to which the land was occupied.

3. Results and discussions

For the 'Renclod Althan' cultivar, the trunk section's surface, at the 3 bio-systems, is 204 cm² (Table 3). Its values oscillate between 154 cm² ('Renclod Althan/Oteşani 8') and 265 cm² ('Renclod Althan/Miroval'), while the 'Renclod Althan/Pixy' biosystem has the value of 194 cm². Regarding the witness ('Renclod Althan/Miroval') very significant negative statistical differences were found and they have the values: -111 cm² ('Renclod Althan/Oteşani 8'), -71 cm² ('Renclod Althan/Pixy') and -61 cm² (compared with the average).

The crown of the trees has an average diameter of 391 cm, 360 cm when 'Oteşani 8' rootstock is used, 394 cm when the 'Pixy' rootstock is used and 419 cm for 'Miroval'.

The average height of the trees is 463 cm and the maximum value is found at the 'Renclod Althan/Miroval' (501 cm) bio-system while the minimum value is found at the 'Renclod Althan/Oteşani 8' (427 cm) bio-system. In the case of the 'Renclod Althan/Pixy' biosystem, the height of the trees is close to the average (460 cm).

The average volume of the crown is 47 m³ and has the values: 37 m³ ('Renclod Althan/Oteşani 8'), 45 m³ ('Renclod Althan/Pixy') and 59 m³ ('Renclod Althan/Miroval').

The land-use degree is, on average, 75.0% with the highest value being recorded when grafting on the 'Miroval' rootstock (86.1%) and the lowest when grafting on the 'Oteşani 8' rootstock (63.5%). When the 'Pixy' rootstock is used, the land-use degree is 76.1%.

The trunk section's surface is, on average, 127 cm² for the 'Alina' cultivar (table 4).The highest value is found at the 'Alina/Miroval' bio-system (173 cm²) while the lowest value is found at the 'Alina/Oteşani 8' bio-system. A value close to the average is found at the 'Alina/Pixy' bio-system (122 cm²). Regarding the witness ('Alina/Miroval'), highly significant negative differences are recorded not only from the rest of the combinations but also from the average, with the following values: -88 cm² ('Alina/Oteşani 8'), -51 cm² ('Alina/Pixy') and -46 cm² (compared to the average).

The diameter of the crown has the average value of 360 cm. In terms of the bio-system the decreasing order is as follows: 448 cm ('Alina/Miroval'), 349 cm ('Alina/Pixy') and 283 cm ('Alina/Oteşani 8').

The average height of the tree is 397 cm and the highest value is found at the 'Alina/Miroval' bio-system (451 cm) while the lowest value is found at the 'Alina/Oteşani 8' bio-system. In the case of 'Alina/Pixy' bio-system, the height of the tree is identical with the average (397 cm).

The volume of the crown has the average value of 37 m³ while the other three bio-systems have the values: 17 m³ ('Alina/Oteşani 8'), 32 m³ ('Alina/Pixy') and 61 m³ ('Alina/Miroval').

The land-use degree has the average value of 63.5%. In terms of the bio-system, it has the following values: 39.2% ('Alina/Oteşani 8'), 59.7% ('Alina/Pixy') and 98.4% ('Alina/Miroval').

The trunk section's surface for the Valor cultivar is 133 cm² (table 5).The values recorded at the three bio-systems are: 104 cm² ('Valor/Oteşani 8'), 130 cm² ('Valor/Pixy') and 166 cm² ('Valor/Miroval'). In comparison with the witness bio-system ('Valor/Miroval') highly significant negative differences are recorded, respectively: -62 cm² for the 'Valor/Oteşani 8' biosystem, -36 cm² for the 'Valor/Pixy' bio-system and – 33 cm² compared to the average.

The diameter of the trees' crown is, on average, 336 cm, with the value of 287 cm for the 'Valor/Oteşani 8' bio-system and 360 cm for the 'Valor/Pixy' and 'Valor/Miroval' bio-systems.

The average height of the trees is 392 cm, the highest value being recorded at the 'Valor/Miroval' bio-system (419 cm) and the lowest at the 'Valor/Oteşani 8' bio-system, while at the 'Valor/Pixy' bio-system the value is 403 cm.

The average volume of the trees' crown is 29 m³ with the highest value at the 'Valor/Miroval' bio-system (36 m³) and the lowest at the 'Valor/Oteşani 8' bio-system (18 m³). Regarding the 'Valor/Pixy' bio-system, the volume of the trees' crown is 33 m³

The average land-use degree is very low (55.3%) with the highest value at the 'Valor/Pixy' (63.5%) and 'Valor/Miroval' (63.5%) bio-systems and the lowest value at the 'Valor/Oteşani 8' bio-system (40.4%).

4. Conclusions

The studied plum varieties are highly influenced by the type of the rootstock, the highest growth vigour being observed when grafting on the 'Miroval' rootstock, followed by the 'Pixy' rootstock while the 'Oteşani 8' rootstock imprints the lowest growth vigour.

The trunk section's surface records, statistically, highly significant negative differences for all the studied graft/rootstock bio-systems by comparison with the 'Miroval' rootstock, considered as witness.

The average values of the trunk section's surface oscillated between 204 cm² for the 'Renclod Althan' cultivar and 127 cm² for the 'Alina' cultivar.

The average value of the diameter of the crown oscillated between 391 cm ('Renclod Althan') and 336 cm ('Valor') and, as part of the graft/rootstock bio-system, the lowest value was recorded at the association 'Alina/Oteşani 8' (283 cm) and the highest at 'Alina/Miroval' (448 cm);

The average height of the trees ranged between 463 cm for the 'Renclod Althan' cultivar and 392 cm for the 'Valor' cultivar, while the volume of the crown had average values between 47 m³ for the 'Renclod Althan' cultivar and 29 m³ for the 'Valor' cultivar.

The land-use degree recorded low averages for the 'Valor' cultivar (55.3%), for the 'Alina' cultivar the recorded value was 63.5% while for the 'Renclod Althan' cultivar of 75%.

As a result of the low land-use degree in the case of the 'Valor' cultivar, we ascertain that we can reduce the planting distance, the cultivar being suitable for higher densities.

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Tables

Table 1. Evolution of average monthly temperatures (Weather station Craiova)

Specification	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total Average
Average temperatures	-3.2	0.0	3.6	11.2	17.5	21.5	22.7	24.1	16.5	9.1	7.2	0.7	10.9
Normal in 48 years	-1.7	0.4	5.1	11.3	16.7	20.3	22.3	21.8	17.2	11.3	5.1	-0.1	10.8
Deviation	-1.5	-0.4	-1.5	-0.1	0.8	0.8	0.4	2.3	-0.7	-1.8	2.1	0.8	0.1

Table 2. Evolution of monthly precipitations (Weather station Craiova)

Specification	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total Sum
Average precipitations	29.4	41.5	69.2	68.2	73.0	82.5	60.9	41.6	37.6	75.4	42.4	47.6	669.6
Normal in 48 years	38.1	37.9	40.8	51.9	63.7	72.9	54.5	48.0	38.1	40.4	52.4	46.7	585.4
Deviation	-8.7	3.6	28.4	16.3	9.3	9.6	6.4	-6.4	-0.5	35.0	-10.0	10.9	84.2

Table 3.Characteristics of the growth way in terms of the graft/rootstock bio-system for the 'Renclod Althan' plum variety (2006-2008)

No.	Graft/ Rootstock	Biometrical values of the plant						
		SST (cm²)	Dif. +/-	Signifi-cance	Diameter of the crown (cm)	Height of tree (cm)	Volume of the crown (m³)	Land-use degree %
1.	Renclod Althan/ Oteşani 8	154	-111	000	360	427	37	63.5
2.	Renclod Althan/Pixy	194	-71	000	394	460	45	76.1
3.	Renclod Althan/ Miroval (Mt)	265	-	Mt	419	501	59	86.1
Average		204	-61	000	391	463	47	75.0

5%LSD=9.0 cm²; 1%LSD=13.7 cm²; 0.1%LSD=22.1 cm²

Table 4. Characteristics of the growth way in terms of the graft/rootstock bio-system for the Alina plum variety (2006-2008)

No.	Graft/ Rootstock	Biometrical values of the plant						
		SST (cm²)	Dif. +/-	Signifi cance	Diameter of the crown (cm)	Height of tree (cm)	Volume of the crown (m³)	Land-use degree (%)
1.	Alina/Oteşani 8	85	-88	000	283	342	17	39.2
2.	Alina /Pixy	122	-51	000	349	397	32	59.7
3.	Alina/Miroval (Mt)	173	-	Mt	448	451	61	98.4
Average		127	-46	000	360	397	37	63.5

5%LSD =3.2 cm²; 1%LSD =4.9 cm²; 0.1% LSD=7.9 cm²

Table 5. Characteristics of the growth way in terms of the graft/rootstock bio-system for the Valor plum variety (2006-2008)

No.	Graft/ Rootstock	Biometrical values of the plant						
		SST (cm²)	Dif. +/-	Significance	Diameter of the crown (cm)	Height of tree (cm)	Volume of the crown (m³)	Land-use degree (%)
1.	Valor/Oteşani 8	104	-62	000	287	353	18	40.4
2.	Valor /Pixy	130	-36	000	360	403	33	63.5
3.	Valor/Miroval (Mt)	166	-	Mt	360	419	36	63.5
Average		133	-33	000	336	392	29	55.3

5% LSD=4.3 cm²; 1% LSD =6.5 cm²; 0.1% LSD =10.5 cm²