THE GROWTH CHARACTERISTICS FOR SEVERAL PLUM VARIETIES CULTIVATED IN CENTRAL ZONE FROM OLTENIA, DEPENDING ON GRAFT/ROOTSTOCK BIO-SYSTEM

PARTICULARITĂȚI ALE MODULUI DE CREŞTERE ÎN FUNCȚIE DE BIOSISTEMUL ALTOI/PORTALTOI LA UNELE SOIURI DE PRUN CULTIVATE ÎN ZONA CENTRALĂ A OLTENIEI

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Abstract: *This study aims to present the characteristics of the supra-terrestrial growth manner on plum tree cultivated in Oltenia central zone, on a plantation from didactical Agricultural Station Banu Mărăcine. The researches was performed from 2006 to 2008, on three plum's varieties – Diana, Silvia and Piteştean – engrafted on three rootstocks – Oteşani 8, Pixy and Miroval, the results intended to establish the trunk section area, the tree crown diameter, the crown volume, the tree height and the field filling degree. It was ascertained that the biggest influence on the three studied types of soil is the one of Miroval rootstock, which gives the biggest growth strength, followed by the pixy rootstock, while the Oteşani 8 rootstock has the lest influence.*

Rezumat: *Lucrarea aceasta prezintă particularităţi ale modului de creştere a părţii supraterane la prunul cultivat în zona centrală a Olteniei, respectiv într-o plantaţie din cadrul Staţiunii Didactice Banu Mărăcine. Cercetările au fost efectuate în perioada 2006-2008, la trei soiuri de prun – Diana, Silvia şi Piteştean – altoite pe trei portaltoi – Oteşani 8, Pixy şi Miroval, determinările având ca scop stabilirea suprafeţei secţiunii trunchiului, diametrului coroanei, volumului coroanei, înălţimii pomului şi gradului de folosire al terenului.S-a constatat că influenţa cea mai mare asupra celor trei soiuri studiate o are portaltoiul Miroval, care imprimă cea mai mare vigoare de creştere, urmat de portaltoiul Pixy, în timp ce portaltoiul Oteşani 8 imprimă soiurilorstudiate cea mai mică vigoare.*

Key words: *variety, rootstock, biosystem*
Cuvinte cheie: *soi, portaltoi, biosistem*

INTRODUCTION

Due to the unassuming needs of clime and soil, plum species has known an important spreading in Romania, especially in the Subcarparthian hills, being cultivate on surfaces were no other agricultural cultures could find the appropriate conditions for living and becoming the most important means of existences for those people.

The plums have an indisputable nourishment importance, being used in both natural and prefabricated state (jam, marmalade, dry, frozen etc).

MATERIALS AND METHODS

The study took place form 2006 to 2008 at the didactical Agricultural Station Banu Mărăcine, placed in the East, at about 8 km from Craiova, on the right side of Craiova-Pitesti-Bucuresti highway.

The biological system consisted of a plum plantation established in 1995, on a brown-reddish soil, consisting in 20 varieties, engrafted on three or four rootstock, each rootstock being represented by 10 repetitions, the experience being placed after the randomized block methods.

The researches for this study were performed on three plum varieties – Diana, Silvia and Piteştean – engrafted on three rootstocks – Oteşani 8, Pixy and Miroval. The trees were planted at a distance of 4.0/4.0m, N-S oriented and shaped as a superposed vase.

The soil has little acid reaction (pH) on the entire depth of the soil profile, with a pH variety between the limits of 5.50 and 6.64.

The hummus content is medium to little supply in the first horizon, the hummus percentage gradually diminishes on the profile from 2,35% in the surface horizon to 0.78%.

The climate in the area is C.f.a.x (continental-temperate climate), with little Mediterranean influence distinguished by the enough amount of rainfalls but varyingly distributed during the year, with droughty summers and maximum of precipitations at the end of spring and the begging of summer (May-June).

The annual average temperature of the three studied years, has went beyond the normal value on 48 years, on an average of 0.9C, being recorded positive deviations during the whole year, except the September when the deviation was negative (table 1).

Table 1

Specification	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
Average Temp.	-0,8	1,9	6,9	12,5	17,5	21,5	24,0	22,7	16,5	12,2	5,5	0,6	11,7
Average/ 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
Difference	0,9	1,5	1,8	1,2	0,8	1,2	1,7	0,9	-0,7	0,9	0,4	0,7	0,9

The annual average rainfalls recorded in the studied period had a value of 622,5 mm, going beyond the normal average on 48 years by 37,1 mm, but their distribution on years and months was varyingly (April 2007 – 0 mm rainfalls) (table 2). Positive deviations from the normal amount were recorded in January, March, August, September and October, while in February, April, May, June, November and December the deviations had negative values.

Table 2

Specification	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
Average Temp.	43,0	28,9	45,1	39,5	57,8	70,5	41,2	94,0	44,6	75,9	43,7	38,3	622,5
Average/ 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
Difference	4,9	-9,0	4,3	-12,4	-5,9	-2,4	-13,3	46,0	6,5	35,5	-8,7	-8,4	37,1

On each soil, engrafted on the three rootstock, on all 10 tree from repetition were made the following biometrical measurements: trunks girth, trunk height, tree height and the crown diameter, both among rows and among trees, on these bases being calculated the average values of the trunks sections area, the crown diameter, the crown volume, the tree height and the ground filling degree.

RESULTS AND DISCUSSION

The assessment concerning the bio-system graft/rootstock evolution in the growth process was performed taking into consideration the growth strength of the plants main dimensions. Thus, at the studied graft/rootstock bio-systems were made the following determinations: trunk section area (TSA), the crown size given by the crown diameter and crown volume, the tree height and the land filling degree.

At Diana variety the average value of the trunk section area is 179 cm, respective 134 cm met at the Diana/Oteşani 8 association, 197 cm at the Diana/Pixy association and the highest value of 205 cm was revealed at the Diana/Miroval combination (table 3). If we consider the last association, Diana/Miroval as reference point, we ascertain that Diana/Oteşani

8 association records a noteworthy negative difference (-71 cm), at Diana/Pixy combination an eloquent negative difference (-8 cm), and the average value of the three combination, related to the same reference point, records a considerable negative difference (-26 cm).

The crown diameter has an average value of 347 cm, the highest value was found on the Diana/Miroval combination (388 cm), followed by Diana/Pixy association (351 cm) and Diana/Oteşani 8 (303 cm).

The average height of the trees is 401 cm, the heights value being recorded at Diana/Miroval association (433 cm) and the lowest at the Diana/Pixy combination (383 cm). At Diana/Oteşani 8 the medium trees height is 386 cm.

The crown volume has a medium value of 33 m, with a maximum of 44 m (Diana/Miroval) and a minimum of 23 m (Diana/Oteşani 8). Diana/Pixy combinations enter up a value near of the average one (31 m).

The soil filling degree has a medium value of 59,1%, the highest value being recorded by the Diana/Miroval combination (73,8%) and the lowest at the Diana/Oteşani 8 association (45,0%). The value nearest the average value can be found at the Diana/Pixy (60,4%).

Table 3

The growth characteristics for Diana plum variety regarding the graft/rootstock bio-system (2006-2008)

Nr crt	VARIETY/ ROOTSTOCK	Biometrical measurements						
		TSA (cm^2)	Dif. +/-	Signification	The crown diameter (cm)	Height trees (cm)	The crow volume (m^3)	The soil filling degree (%)
1.	DIANA/ OTEŞANI 8	134	-71	000	303	386	23	45,0
2.	DIANA/ PIXY	197	-8	00	351	383	31	60,4
3.	DIANA/ MIROVAL (Mt)	205	-	Mt	388	433	44	73,8
AVERAGE		179	-26	000	347	401	33	59,1

DL 5% = 4,1 cm^2, DL 1% = 6,2 cm^2, DL 0,1% = 10,0 cm^2

Concerning Silvia variety, it can be noticed that the medium value of the trunk section area is 183%, decreasing in the following order: 203 cm when it is used the Miroval rootstock, 177 cm using the Oteşani 8 rootstock and 168 cm when it is used Pixy rootstock (table 4). If it is considered Silvia/Miroval bio-system as reference point, it can be noticed noteworthy negative differences, as: -26 cm at Silvia/Oteşani 8 association, -35 cm at Silvia/Pixy combination and -20 cm given to the average.

The crown diameter has a medium value of 378 cm, with the following values: 404 cm at engrafting on Miroval, 386 on engrafting on Pixy and 363 at engrafting on Oteşani 8.

The average tree height is 395 cm, the highest value recorded when using Miroval rootstock (435 cm), followed by the Pixy (388 cm) and Oteşani 8 (362 cm).

The medium value of crown volume is 37 m, the maximum value being found at Silvia/Miroval combination (48 m), followed by Silvia/Pixy (33 m) and Silvia/Oteşani 8 (31 m) associations.

The ground filling degree is on an average of 70,1%, no combination succeeded to provide a 100% covering, in the next succession: Silvia/Miroval (80,1%), Silvia/Pixy (66, 4%) and Silvia/Oteşani 8 (64,6%).

Regarding to the Piteştean variety, it can be seen a medium value of trunk section area of 99 cm2, the values varying from 59cm2 using the Oteşani 8 rootstock, 101 cm2 using the Pixy rootstock and 136 cm2 when it is used the Miroval rootstock (table 5). If it is taken the Piteştean/Miroval bio-system as reference point, then it can be ascertain that significant

negative static differences exist at the other bio-systems, as: -77 cm2 at Piteştean/Oteşani 8 bio-system, -35 cm2 at Piteştean/Pixy bio-system and -37 given to the average.

Table 4

The growth characteristics for SILVIA plum variety regarding the graft/rootstock bio-system (2006-2008)

Nr crt	VARIETY/ ROOTSTOCK	Biometrical measurements						
		TSA (cm^2)	Dif. +/-	Significa tion	The crown diameter (cm)	Height trees (cm)	The crow volume (m^3)	The soil filling degree (%)
1.	SILVIA/ OTEŞANI 8	177	-26	000	363	362	31	64,6
2.	SILVIA/ PIXY	168	-35	000	368	388	33	66,4
3.	SILVIA/ MIROVAL (Mt)	203	-	Mt	404	435	48	80,1
AVERAGE		183	-20	000	378	395	37	70,1

DL 5% = 2,5 cm^2, DL 1% = 3,8 cm^2, DL 0,1% = 6,1 cm^2

The crown diameter registers values differing from 319 cm using the Miroval rootstock, 306 cm using the Pixy rootstock and 229 using the Oteşani 8 rootstock, and results an average of 285 cm.

The medium tree height is 321 cm, varying from 350 cm engrafted on Miroval, 331 cm engrafted on Pixy and 281 engrafted on Oteşani 8.

The crown volume has an average value of 17 m3, with values from 9 m3 when using the Oteşani 8 rootstock 8, 19 m3 when using the Pixy rootstock and 22 m3 when using the Miroval rootstock.

At this variety, the soil utilization degree is rather scanty, on an average of 39,8%, all the recorded values being under 50%, as following: 25,7% at Piteştean/Oteşani, 45,9% at Piteştean/Pixy combination and 49,9% Piteştean/Miroval.

Table 5

The growth characteristics for PITEŞTEAN plum variety regarding the graft/rootstock bio-system (2006-2008)

Nr crt	VARIETY/ ROOTSTOCK	Biometrical measurements						
		TSA (cm^2)	Dif. +/-	Significat ion	The crown diameter (cm)	Height trees (cm)	The crow volume (m^3)	The soil filling degree (%)
1.	PITEŞTEAN / OTEŞANI 8	59	-77	000	229	281	9	25,7
2.	PITEŞTEAN / PIXY	101	-35	000	306	331	19	45,9
3.	PITEŞTEAN / MIROVAL(Mt)	136	-	Mt	319	350	22	49,9
AVERAGE		99	-37	000	285	321	17	39,8

DL 5% = 3,2 cm^2, DL 1% = 4,9 cm^2, DL 0,1% = 7,9 cm^2

CONCLUSIONS

- the plum soil growth is by far influenced by the rootstock type, the most vigorous growth being noticed at engrafting on Miroval rootstock, followed by Pixy rootstock, while the Oteşani 8 gives the lowest growth strength;
- comparing to Miroval rootstock which is considered the reference point, the trunk section area records noteworthy negative statistic differences at all of the studied grafts/rootstocks, except the Diana/Pixy combination which records separate significant negative differences;
- the average values recorded to the three varieties with regard to trunk section area varies from 99 cm2 to the Piteştean variety and 183 cm2 to Silvia variety.
- the medium trees crown diameter value oscillated from 285 cm (Piteştean) and 378 cm (Silvia) and within the bio-system graft/rootstock the lowest values was observed to Piteştean/Oteşani 8 association (281 cm) and the highest to Silvia/Miroval (404 cm);

- the trees average height varied between 321 at Piteştean variety and 410 cm at Diana variety, while the crown volume recorded medium values between 17 m3 at Piteştean variety and 37 m3 at Silvia variety;

- the field filling degree established really reduced medium values at Piteştean variety (39,8%), 59,1% for Diana variety, while for Silvia variety the average value was 70,1%;

- because of the reduced ground utilization degree in the Piteştean variety case, it can be take into consideration that the plantation distance may be diminished, the variety being suited to higher density.

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