

CHARACTERISTICS ON THE GROWTH MODE OF UNDERGROUND AND OVERGROUND PARTS IN UNTOASĂ BOSC PLUM VARIETY

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ABSTRACT

The pear comes early in production, produces a lot and constantly, ensuring fresh fruit consumption for 8-10 months a year.

The research was carried out during 2014-2016 within a family garden, located 50 km away from Craiova. The biological material is represented by the Untoasă Bosc pear variety grafted on the French rootstock. The plantation was established in 2000, the trees being led in the form of a stacked palm consisting of 6 structures.

The purpose of the paper is to highlight, during the three years of study, how the pear behaves in the growth process of both the air and the underground part.

The Untoasă Bosc pear variety has a good development of the overground part and the root system is well developed and distributed throughout the depth range studied (0-100 cm), both at a distance of 1 m from the trunk and 2 m from the trunk.

INTRODUCTION

The pear comes early on the fruit, produces a lot and constantly, ensuring a fresh fruit consumption 8-10 months. The pears contain carbohydrates, pectic substances, crude protein, malic acid, mineral substances, vitamins (I.F. Radu et. al., 1985).

Originally from the temperate regions of Europe and Asia, the **Pear (*Pyrus communis*)** is appreciated for its tasty, sweet, juicy and aromatic fruits.

It is a quick and natural source of energy due to its high glucose and fructose content and has a cooling effect, a glass of pear juice being able to reduce fever when it occurs.

The diversity of sites and types of soil established for the extension of pear culture in our country requires the selection of the most suitable rootstocks

associated with large-scale varieties that make the most economical use of existing soil fertility and improved by applied crop technology (Popescu M. Et. al., 1992).

Pear saplings are more sensitive to lack of moisture in July-August and do not resume their growth in September because they form terminal bud, which requires irrigation in the summer months (Baciu A., A., 2005).

M. Quartieri et. al., 2011 have conducted two experimental studies in 2002 and 2004 to evaluate the performance of the "Abbe Fétel", "Conference" and "Bartlett" varieties grafted on eight rootstocks, finding that the Fox 9 rootstock showed greater vigour and slightly higher yield compared to BA29 quince and good quality fruits.

MATERIAL AND METHOD

Pear color has grown greatly in the last decades and has diversified a lot. Excellent fruit quality, high productivity and a large number of varieties of different genetic background have contributed to the expansion and modernization of this crop.

The purpose of the paper is to reveal during the three years of study how the pear behaves in the process of growth, both of the aerial part and the underground part, under the pedo-ecological conditions specific to the hilly area of Oltenia.

The research was carried out during 2014-2016 within a family garden, located 50 km away from Craiova. The soil is a poorly pseudogleised reddish preluvosoil with a humus content of

2.45% in the surface horizon, and the soil's reaction is poorly acidic.

The biological material is represented by the Untoasă Bosc pear variety grafted on the French rootstock. The plantation was established in 2000, the trees being led in the form of a stacked palm consisting of 6 structures.

Within this variety were followed:

1. *determining how to increase the aerial part*, respectively: tree height, trunk height, crown height, crown diameter and trunk diameter. All these determinations were made by means of the roulette and the calliper;

2. *determining how the root system is distributed*, both at a distance of 1 m from the trunk and 2 m from the trunk, using the profile method (Oscamp-Dragavțev).

RESULTS AND DISCUSSIONS

1. *Appreciation of graft/rootstock biosystems behaviour in the growth process* was made after the vigour of growth of the main plant sizes (Beackbane and Thompson, 1947; Winkler, 1961; Botu I., 1978).

Thus, the following elements were taken into consideration in the studied graft/rootstock biosystem (Untoasă Bosc/French rootstock): tree height, trunk height, crown height, crown diameter and trunk diameter.

Regarding the way of aerial part growth, during the three years of study,

the following were found (Table 1): the average tree height was 340 cm; the average height of the trunk was 67 cm; the average crown height was 273 cm; the median diameter of the crown (average value between tree crown diameter between trees per row and tree crown diameter between rows) was 408 cm; the average trunk diameter (measured at a height of 10 cm from the soil and representing the mean value between the trunk diameter in the direction of the row and the trunk diameter between the rows) was 16.2 cm.

Table 1

Characteristics on the growth mode of the aerial part of Untoasă Bosc pear variety

Characteristics on the growth mode of the aerial part	Average value (2014-2016)
Tree height (cm)	340
Trunk height (cm)	67
Crown height (cm)	273
Crown diameter (cm)	408
Trunk diameter (cm)	16,2

2. Establishing the distribution of the root system

Through the profile method, we aimed to know the arrangement of the root system in the Untoasă Bosc pear variety, grafting using the French rootstock, following roots in the following thickness categories: 0-3 mm, 3-5 mm and over 5 mm .

At a distance of 1 m to the trunk, Depending on the three thickness categories, the distribution of the roots over the depth ranges was the following:

Roots with a diameter of up to 3 mm - were found a total of 164, spread over the depth range of 0-100 cm, most

of which were found on 20-30 cm and 37 roots (Table 2), respectively.

A significant number of roots were found on the intervals of 30-40 cm (34 roots) and 10-20 cm (33 roots) (Figure 1).

Under the depth of 80 cm the number of roots discovered is reduced compared to the upper intervals (5 roots in the range 80-90 cm and 2 roots in the range 90-100 cm), the same can be said about the first depth range (0- 10 cm) where only 7 roots were discovered. In terms of the share of the roots, about 75% of them are distributed over a depth of 0-50 cm.

Table 2

Distribution of roots with 0-3 mm in diameter at a distance of 1 m from the trunk

Depth range (cm)	Roots number	Percentage (%)
0-10	7	4,27
10-20	33	20,12
20-30	37	22,56
30-40	34	20,73
40-50	12	7,32
50-60	14	8,53
60-70	10	6,10
70-80	10	6,10
80-90	5	3,05
90-100	2	1,22
TOTAL	164	100

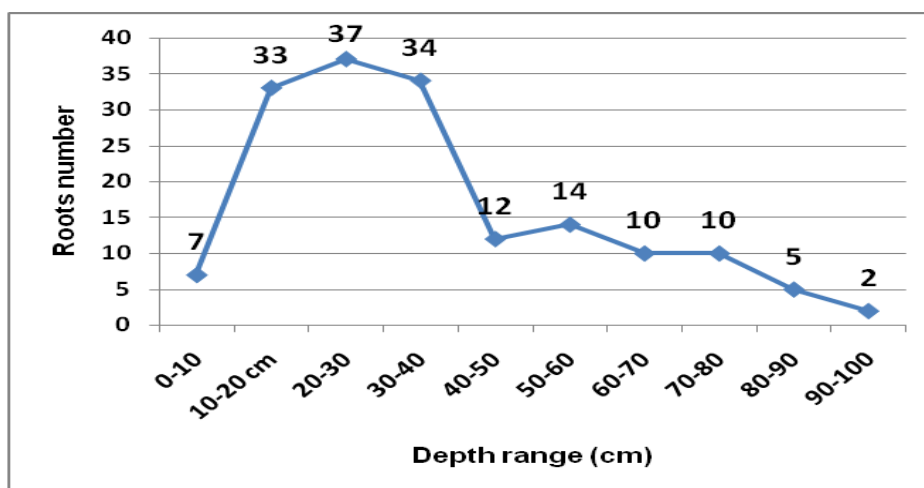


Fig. 1. Distribution of roots with 0-3 mm in diameter at a distance of 1 m from the trunk

- *Roots with a diameter of 3-5 mm* - they were 2, being found up to a depth of 60 cm, respectively one root on the

intervals of 10-20 cm and 60-70 cm (Table 3, Figure 2).

Table 3

Distribution of roots with 3-5 mm in diameter at a distance of 1 m from the trunk

Depth range (cm)	Roots number	Percentage (%)
0-10	0	0
10-20	1	50,00
20-30	0	0
30-40	0	0
40-50	0	0
50-60	0	0
60-70	1	50,00
70-80	0	0
80-90	0	0
90-100	0	0
TOTAL	2	100

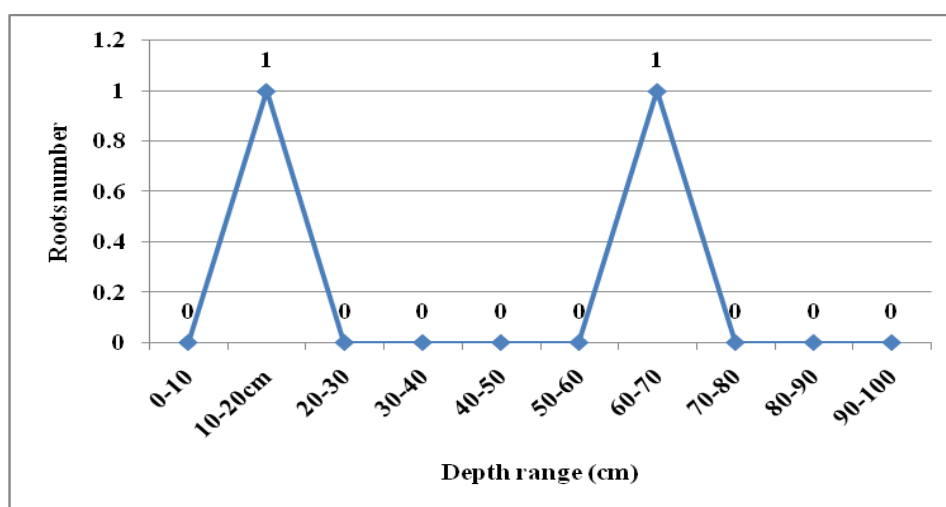


Fig. 2. Distribution of roots with 3-5 mm in diameter at a distance of 1 m from the trunk

- *Roots with a diameter over 5 mm* - were found in quite a significant number, respectively 11 roots, spaced intervals up to a depth of 90 cm. Most roots were found on the interval 30-40 cm (3 roots),

- followed by the 20-30 cm and 50-60 cm intervals, with 2 roots, while on the intervals of 40-50 cm, 60-70 cm, 70-80 cm and 80-90 cm, a single root was found (Table 4, Figure 3).

Table 4

Distribution of roots over 5 mm in diameter at a distance of 1 m from the trunk

Depth range (cm)	Roots number	Percentage (%)
0-10	0	0
10-20	0	0
20-30	2	18,18
30-40	3	27,28
40-50	1	9,09
50-60	2	18,18
60-70	1	9,09
70-80	1	9,09
80-90	1	9,09
90-100	0	0
TOTAL	11	100

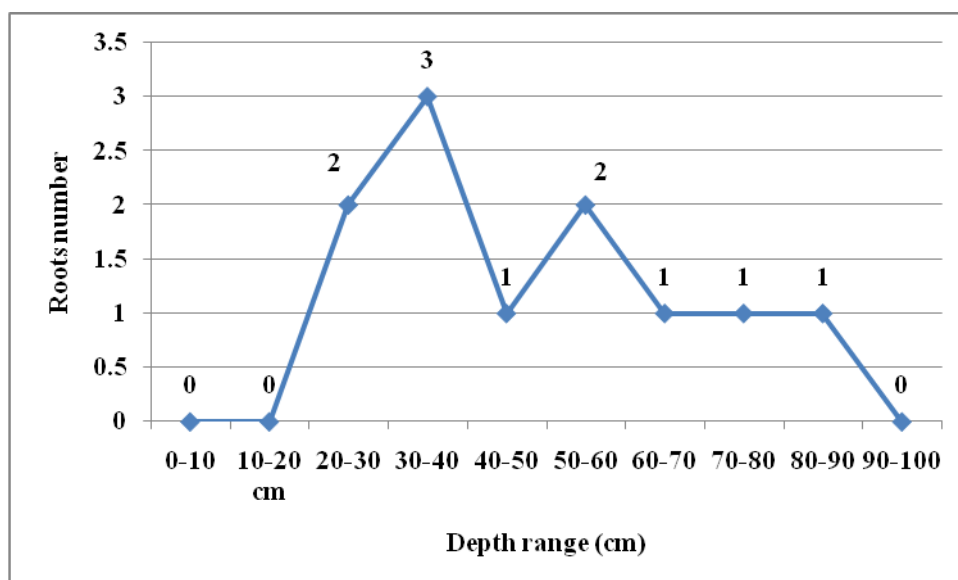


Fig. 3. Distribution of roots over 5 mm in diameter at a distance of 1 m from the trunk



Fig. 4. Aspects regarding distribution of roots at a distance of 1 m from the trunk(original)

At a distance of 2 m to the trunk, the distribution of roots was the following:

- *Roots with a diameter of up to 3 mm* - were present throughout the entire depth range of 0-100 cm in 151 roots, of which 27 were on the depth range of 40-50 cm, respectively with a share of 17.88% (Table 5).

A significant number of roots were also found on depths 30-40 cm (26 roots), 50-60 cm (19 roots) and 20-30 cm (17 roots) (Figure 5).

We also find that about 60% of the roots in this thickness category are distributed to a depth of 50 cm, which means a fairly even distribution of the roots throughout the depth range.

Table 5

Distribution of roots with 0-3 mm in diameter at a distance of 2 m from the trunk

Depth range (cm)	Roots number	Percentage (%)
0-10	3	1,99
10-20	16	10,59
20-30	17	11,26
30-40	26	17,22
40-50	27	17,88
50-60	19	12,58
60-70	14	9,27
70-80	13	8,61
80-90	8	5,30
90-100	8	5,30
TOTAL	151	100

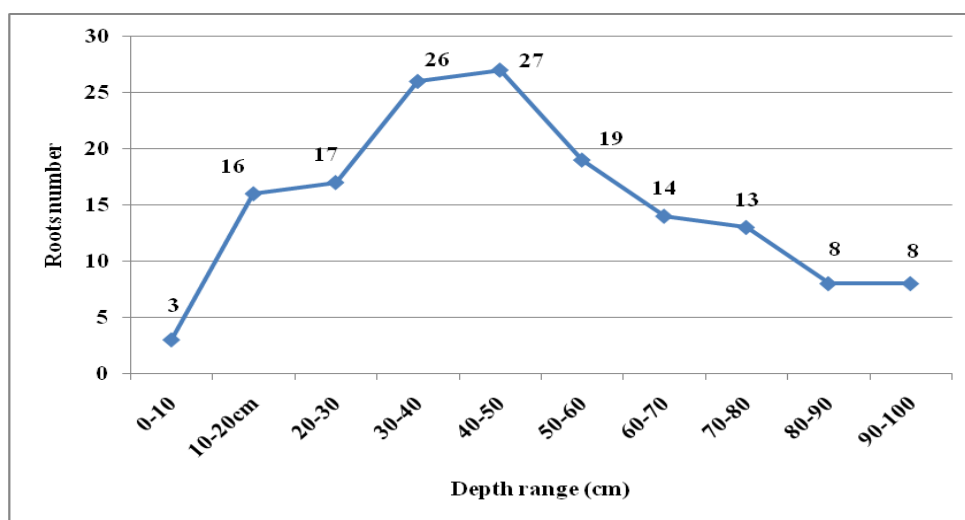


Fig. 5. Distribution of roots with 0-3 mm in diameter at a distance of 2 m from the trunk

- The roots with 3-5 mm thickness - There were discovered 3, disposed on two depth ranges as follows: a root of 10-20 cm and two roots in the

range of 20-30 cm (Table 6, Figure 6). We find that the roots found are entirely arranged up to a depth of 30 cm

Table 6

Distribution of roots with 3-5 mm in diameter at a distance of 2 m from the trunk

Depth range (cm)	Roots number	Percentage (%)
0-10	0	0
10-20	1	33,33
20-30	2	66,67
30-40	0	0
40-50	0	0
50-60	0	0
60-70	0	0
70-80	0	0
80-90	0	0
90-100	0	0
TOTAL	3	100

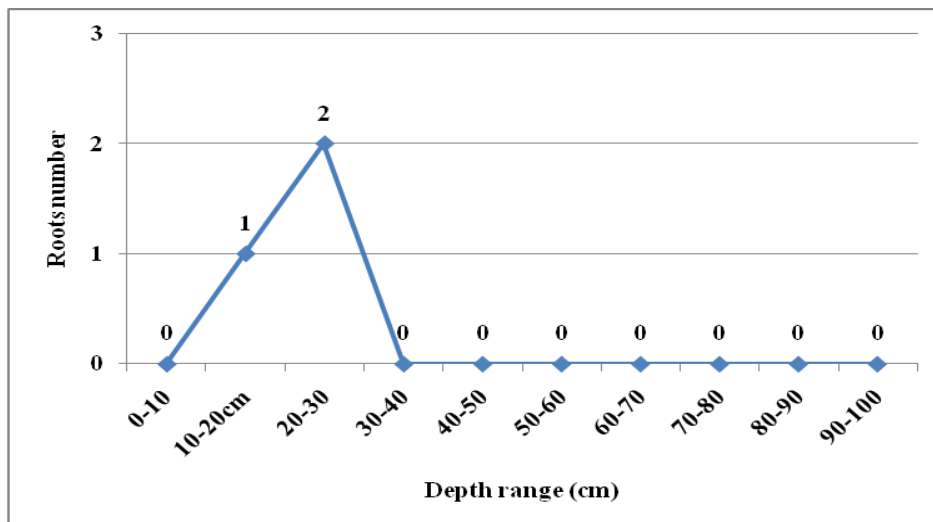


Fig. 6. Distribution of roots with 3-5 mm in diameter at a distance of 2 m from the trunk

- Roots over 5 mm - were 5, being distributed to a depth of 40 cm, namely four roots in the range of 20-30

cm and a root in the range 30-40 cm (Table 7, Figure 7).

Table 7

Distribution of roots over 5 mm in diameter at a distance of 2 m from the trunk

Depth range (cm)	Roots number	Percentage (%)
0-10	0	0
10-20	0	0
20-30	4	80,00
30-40	1	20,00
40-50	0	0
50-60	0	0
60-70	0	0
70-80	0	0
80-90	0	0
90-100	0	0
TOTAL	5	100

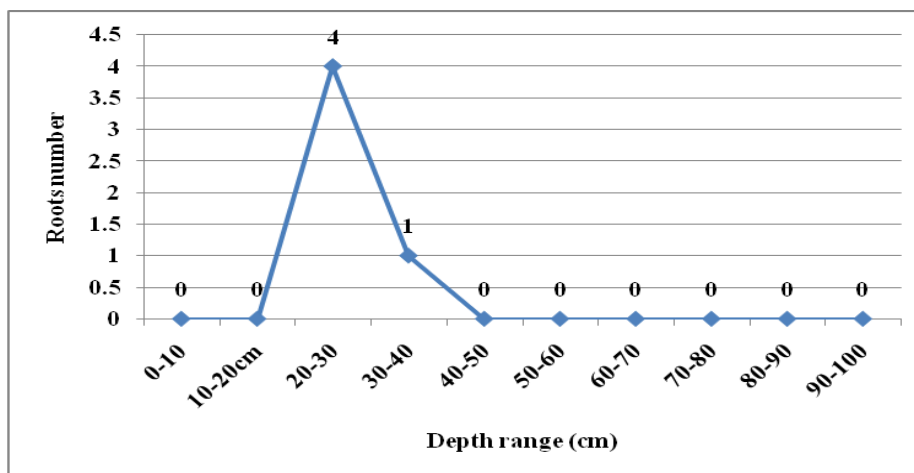


Fig. 7. Distribution of roots over 5 mm in diameter at a distance of 2 m from the trunk



Fig. 8. Aspects regarding distribution of roots at a distance of 2 m from the trunk(original)

CONCLUSIONS

The Untoasă Bosc pair variety has a good development of the overground part, namely the height of the tree, the height of the trunk, the height of the crown, the diameter of the crown, the diameter of the trunk.

The radicular system is well developed and distributed throughout the entire depth range studied (0-100 cm), both at a distance of 1 m from the trunk and 2 m from the trunk.

At a distance of 1 m from the trunk, 177 roots were found, of which 3/4 (75%) were found up to a depth of 50 cm.

With regard to the distribution by thickness category, 164 roots are found in the 0-3 mm category, 2 roots in the 3-5 mm category and 11 roots in the category over 5 mm.

At a distance of 2 m from the trunk, on a depth of 0-50 cm, about 60% of the total found roots (159 roots) were found.

By thickness category, the distribution of roots was as follows: 151 roots with a thickness of up to 3 mm, 3 roots with a thickness of 3-5 mm and 5 roots with a thickness of more than 5 mm.

By depth ranges studied and the thickness category, the largest number of roots, at a distance of 1m from the trunk, is 37, from the category of thickness up to 3 mm, on the depth range of 20-30 cm, respectively 27 roots on the depth range of 40-50 cm, in the same thickness category (up to 3 mm) at a distance of 2 m from the trunk.

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