

RESEARCH ARTICLE

(Open Access)**Studying on rooting ability of olive cultivars region of Tirana**

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Abstract:

The results brought in this study present the rooting ability of semi dendric olive pieces, including the five most important cultivars of the area which are used as oil cultivar ("olive white", "Kushan", "Karre" and "black olive from Ndroq Tirana") or as cultivar used for oil and salting (Boç and red olive). Anchoring (sample) material is taken from three age-old mother plants and with a good health and vegetation condition. Previously pieces are treated with IBA at 4000 ppm concentration.

Observations made after 45 days from the time of placement for anchoring have shown that for all cultivars had conducted the complete callus, while in particular cultivars are found a considerable amount of pieces that have shaped the initial roots. The results received after 60 days, for the rooting, show that between specific cultivars there is a significant variability by forming three groups: the first group with the highest rooting percentage (50 < %) cultivars belong, "Karr", "olive white" and "Kushan". In the second group with average rooting (30-50 %) cultivar introduced "Boc", while cultivars "olive red" and "black olive from Ndroqi" have a weak rooting (30 % >).

The highest yield was taken when rooting plants from mother plants, from where the pieces are taken and prepared, which are in a more advanced stage of vegetation..

Keywords: olive, cultivar, nebulosity, callus, anchoring.

1. Introduction

For renovation of Albanian olive production we must rely on full assessment of autochthonous (native or indigenous) genetic resources, on updating with more advanced techniques the nurseries and reducing the production costs.

The possibility that holds the technique of augmentation with nebulosity, allows to meet the high demands for new planting, it has low and stable costs, and enables the production plant certified as EU guidelines predict (Caruso et al 2011; Claudio Di Vaio et al 2008) and the regulation of MAF. It can really contribute to a restoration of all olive production chain. To follow and accomplish the above goals is necessary to develop the production system for flexible and reliable plants, free from traditional techniques of grafting on seed springing, which are often of unknown genetic origin and in unsafe phytosanitary conditions. (Di Vaio et al 2009)

Having regard the above, through this study we intend to clarify which is the rooting ability of cultivars for the region of Tirana and how the time of taking pieces affects in the rooting yield.

2. Material and Methods

The study was conducted in the greenhouse located in Valias, Tirana; - owned by Agricultural University of Tirana. The green house was built in 2010 and meets all modern requirements for the augmentation by nebulosity technique. In the study we included six cultivars, that are in the region of Tirana, and are used for oil (Olive white " , " Kushan" , "Karr" , and "black olive from Ndroqi" or cultivar dual use: oil & salting ("Boc " and "red Olives") The plant material for multiplication is taken from three mother plants with homogeneous development of vegetative growth and productive activity.

The above plants are centennial and are part of autochthonous germ plasma fund. (Bacu et al 2011; Thomaj et al 2003). To provide healthy material, the plants were submitted for two consecutive years under a specific Agro-technique where we distinguish; conducting regenerating pruning, manure and abundant organic chemical treatments for parasites etc... Saplings for preparing the pieces were taken in the first decade of March.

Obtaining planting material, preparation of the pieces, and planting took place during the same day.

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Pieces were taken from the middle of the spring by selecting those with 2.5-3.5mm in diameter, about 12-15 cm in length with 4 nodes. The leaves nodes of the bottom two pulled leaving only 4 leaves. Cutting at the base of the cloth became the diaphragm plane of the node. Further on pieces were treated with a solution of IBA hydro alcoholic in 4000 ppm concentration for about 5 seconds. The treatment included only the basis of the piece, about 1 cm. Further on the pallet pieces were put in the pure perlite substrate. For each cultivar 250 pieces were put for rooting.

To see the effect of time, of receiving the pieces, in a second test pieces were used by cultivar "White Olive Tirana" received at a distance of about a week of each other, starting from 15 March to 16 April.

The temperature on the basis of the cloth was held in the boundaries of 22-25 ° C, while the air humidity in the environment near pieces was 85-95%.

Among analyzed indicators we mention:

- The time needed for the piece's callus formation
- The percentage of rooting for each cultivar and date.
- The number of roots formed
- The length of roots until the moment of transplant

3. Results and Discussion

From the periodic observations of the callusation and differentiation process of roots, it was found that after 45 days for all cultivars the full callusation of the pieces base is realized. However, there exist obvious changes between specific cultivars, thus, to cultivars "O. White "and" Kushan ", the callus formation is more complete, and even are found a considerable amount of pieces that have shaped the initial roots (Figure 1).



Figure 1. The pieces of the cultivar "White Olive" after 45 days that have formed a satisfactory number of roots being prepared for transplant **b**-Pieces of cultivar "Red Olive" after 45 days callus fully formed but have not yet differentiated root.

On the contrary, cultivars "Red Olive" and "Olive Black Ndroqi" have formed the callus but without differentiating root. To the latter ones, the majority of pieces placed for rooting have formed abundant of callus but they miss differentiation of roots. It clearly appears that the callus is formed by the reactivation of cambium while the reactivation of cells lacks pericycle for differentiating roots (Figure 2).

After about 60 days, while the roots are fully formed, the buds are still not bloomed. This is the best moment for transplant pieces (Figure 3). Any delay in transplant enables the opening of bud and hinders catching during transplant.

3.2. The rooting ability of the studied cultivars.

The received results about the rooting ability show that there is a great variability between cultivars. (Figure. 4, Table.1).

Cultivars "White Olive", "Karr" and "Kushan" have a very good rooting skill and reach the productivity of 57% to 62.5%. Cultivar "Boc" rooting reaches an average yield of about 38.8%, but that certainly is a satisfactory productivity for its increasing blurriness method. Two other cultivars obtained in the study, "Red olive" and "black olive from Ndroqi" give a lower rooting percentages that ranges from 20.2 to 22.3%.

From the results above we draw attention to the fact that cultivars with average growth, "Karr", "The White Olives" and "Kushan", have given better results in rooting, while cultivars with stronger growth,

Studying on rooting ability of olive cultivars

"The Black Olive" and "red olive" have given weaker outcomes. Cultivar "Boc" there is an intermediate growing between the two groups and the results of rooting preserves that same position.

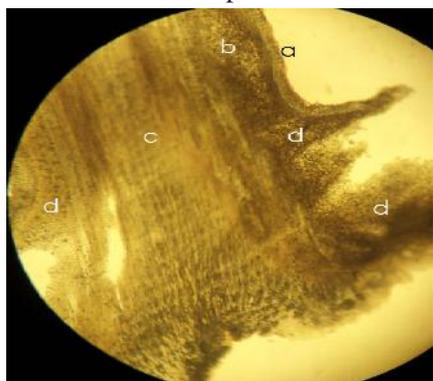


Figure 2. The longitudinal cutting of pieces of callus to cultivar "Red Olive" where clearly can be seen the powerful reactivity of cambium and abundant formation of callus

cells, but without differentiated root. **a**-phloem **b**- cambium **c**- xylem **d**-callus.

Table 1. Data about rooting of the studied cultivars (Positive values show pairs of means that are significantly different)

Level			Mean
Kushan	A		62.533333
Karren	A	B	60.133333
U. Bardhe Tirane	A	B	57.000000
Boc	B		38.800000
U. i kuq	C		22.366667
U.i Zi Ndroq	C		20.200000

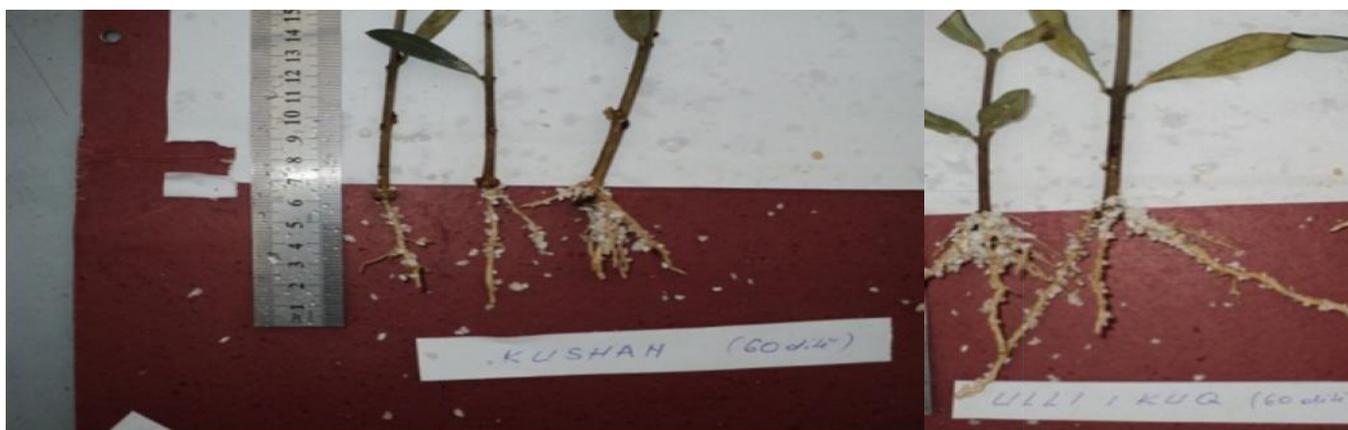


Figure 3. Rooted pieces, ready for transplant

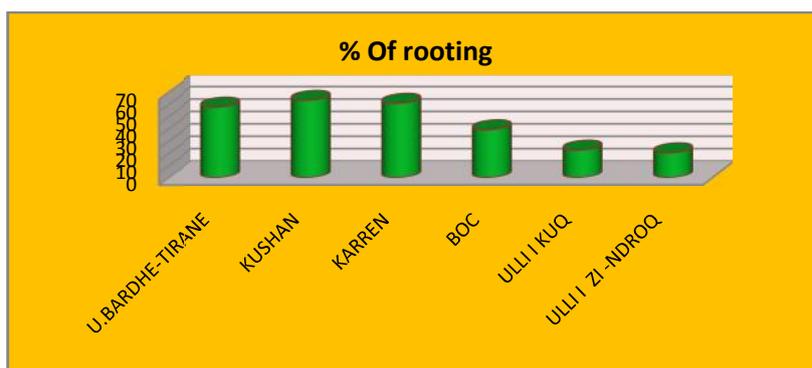


Figure 4. Data about the rooting of the studied cultivars

If we refer to other authors (Dettori 1979; Di Vaio 2008) etc, we would arrange the studied cultivars into groups depending on the rooting ability in cultivars with high (> 50%) rooting "Karr", "The White Olives" and "Kushan" rooting cultivars with average ability (30-50%) "Boc" and cultivars with

lower rooting ability (<30%), "Red olives" and "black Olives from Ndroq". (Figure.5)

In this study, in addition to the rooting ability of the cultivars, other indicators were analyzed as well like the number of roots and their length for each cultivar.

For these indicators measurements were carried out on 50 root pieces taken at random for each iteration.

From the obtained data it results that the highest number of roots were formed by cultivars "Karren", "Boç", and "White Olive Tirana", respectively 8.8, 8.4 and 7.9 on average root for each piece. (Figure.6, Table 2). After them ranks "Black Olive from Ndroq" with 6.2 root pieces and further Cv. "Kushan" and "Red Olive". Interesting is the fact that cultivar "Kushan", although has a higher rooting ability, it has given less roots for each rooted piece. However, the number of roots (3 or more) is sufficient and ensures during the transplant occupancy, and further increase in the parcel; however, for the indicator number of roots per piece, the studied cultivars can be broken down into three groups:

In the first group, with over 7 roots cultivars include "Karren", "Boc" and "white olive tree".

In the second group (4-6 roots), cultivar "from Ndroq black olive".

In the third group (1-3 roots) cultivars "Kushan" and "Red Olive". (Table 2. Figure.6,7).

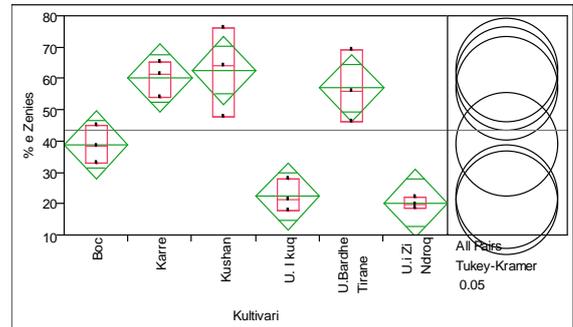


Figure 5. One-way Analysis of % conceived by Cultivar

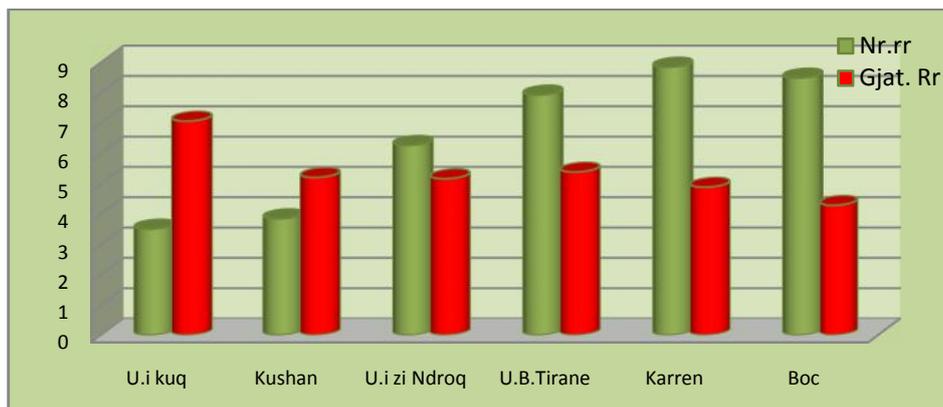


Figure 6. Numer root pieces and the length of the roots for cultivars analyzed.

Table 2. Numer root pieces for the analyzed cultivars. (Positive values show pairs of means that are significantly different) The average number of roots for cultivars analyzed

Level		Mean
Karren	A	8.8400000
Boc	A B	8.4600000
U. B. T	A B	7.9200000
U. i zi Ndroq	B C	6.2600000
Kushan	C D	3.8400000
U. i Kuq	D	3.5000000

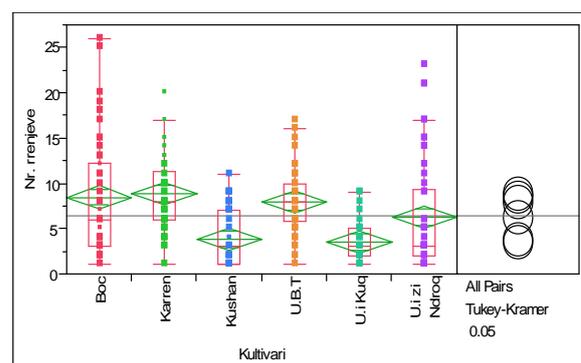


Figure 7. One-way Analysis of the number o roots by Cultivar

For monitoring indicators the length of roots for each piece, results that has not large differences between cultivars. The biggest difference, even statistically proven to find the cultivar "Red Olive", while all other cultivars represent a statistical group despite differences between them. (Figure 8, Table.3).

Is worth mentioning that the cultivar 'Red Olives "that ensures greater length of roots has the lowest number of their pieces rooted.

Interesting fact is that not only for the variety is "Olive red" but also for other cultivars, the oblique correlation has been found between the number of roots and of their length, how the greater number of roots as the smaller of their the length. (Figure.9)

3.3. Impact of time of receipt of the pieces.

A significant factor that influences the efficiency of rooting the pieces for a cultivar is the term of receipt of the pieces, which connects to the physiological state of the pieces. For the impact of this factor several studies have been conducted, and continue even today, for different cultivars and different ecological areas; (Hartmann1964, Loreti et al 1964, 1967 Tombesi, Di Vaio et al., 2009).

From what we see above, to prove how time of receipt of pieces impacts on the rooting ability during the year 2012 for variety "white Olive Tirana" we have obtained pieces weekly, starting from 15 March to April 16, their preparation, treatment with IBA and rooting conditions have been the same. For each date (variant) are decided for rooting 150 pieces. Grubbing and assessment of rooting performance was carried out after 65 days.

Table 3. Length of roots for cultivars analyzed (Positive values show pairs of means that are significantly different)

Level		Mean
U.i Kuq	A	7.0600000
U.B.T	B	5.3800000
Kushan	B	5.2000000
U.i zi Ndroq	B	5.1600000
Karren	B	4.8800000
Boc	B	4.2900000

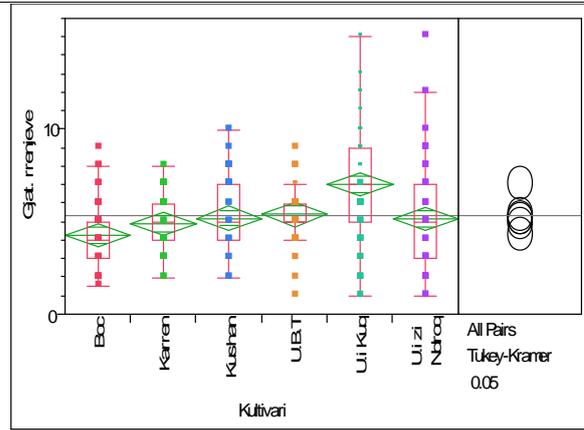
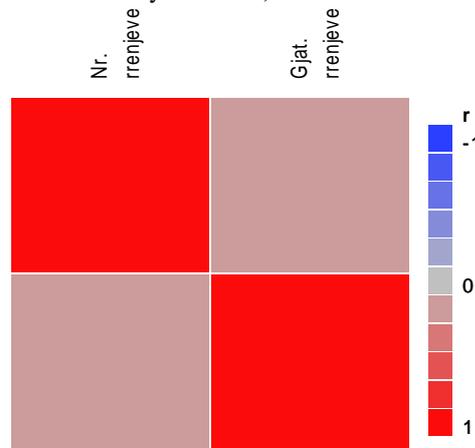


Figure 9. Correlative connection between the number of roots and length of roots (One-way Analysis of the length of the roots by Cultivar)



Color Map On Correlations

From obtained the data we see that the best result was obtained at the deadline (April 16) that correspond with a more advanced stage of vegetative activity of the mother plant from where the pieces were taken. This phenomenon has been found by other authors (Caruso et al. 2011, Hartmann et al 1964 Tombesi 1967) and explained by the increased activity of pericycle that is responsible for establishing of adventitious roots. In this period is taken maximum yield variety rooting for "Olive White", 62%. The weakest result was obtained on March 15, while with the advancement the limits and vegetative increased activity of the mother plant, and rooting yield has increased. (Figure 10,11)

The same legitimacy is found and the average number of roots for each piece. (Figure 10;Table 5).

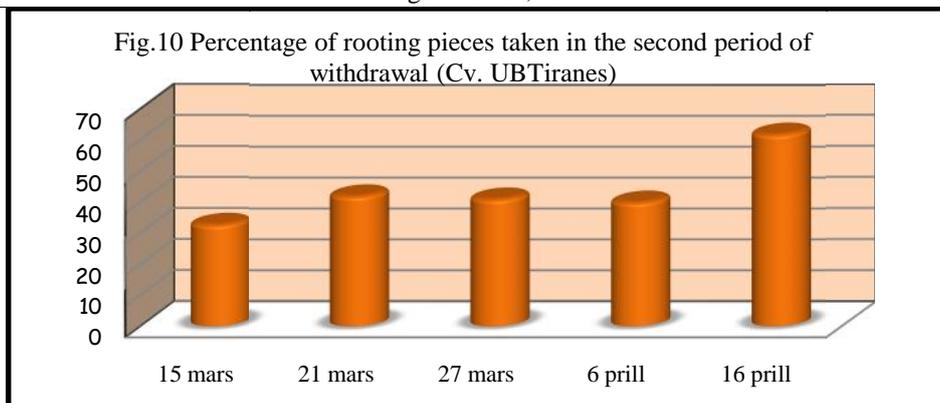


Fig.10 Percentage of rooting pieces taken in the second period of withdrawal (Cv. UBTiranes)

Table 4. Percentage of rooting pieces taken in the second period of withdrawal (Positive values show pairs of means that are significantly different)

Level		Mean
16/4	A	62.000000
21/3	B	42.000000
27/3	B	41.000000
6/4	B C	37.000000
15/3	C	32.200000

Table 5. The average number of roots by the time of placement for anchoring (Positive values show pairs of means that are significantly different)

Level		Mean
16/4	A	5.6000000
21/3	A B	5.0000000
6/4	A B C	3.8000000
15/3	B C	3.5000000
27/3	C	2.9500000

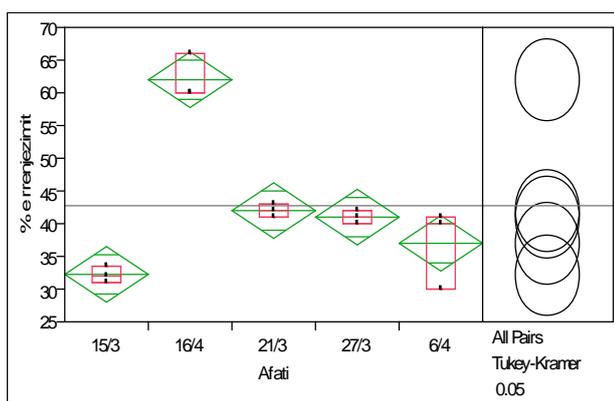


Figure 11. One-way Analysis of % roots by term.

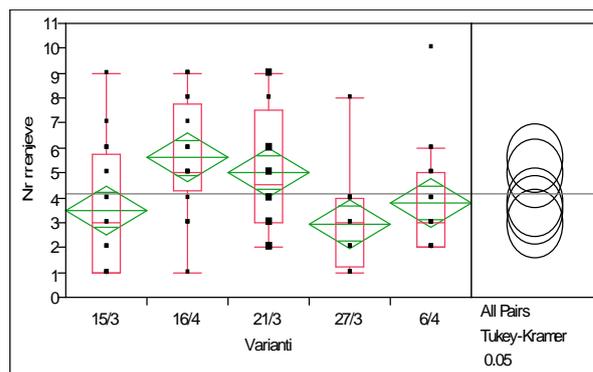


Figure 12. One-way Analysis of the number of roots by Variation

4. Conclusions

Based on the data analysed above, we conclude:

- In the conditions of maintaining an optimal regime of temperature, air humidity and humidity substrate, the full callus formation of the piece happens in the time frame of about 40 to 45 days and in particular cultivars we see even differentiation of roots.
- Between different cultivars there is a pronounced variation of the rooting ability, related of internal genetic factors. From the studied cultivars, we can differentiate cultivars for high rooting "Karr", "Olive White" and "Kushan". Cultivar "Boc" has average rooting, while cultivars "red olive "and" black olive from Ndroq "have weak rooting.
- Cultivars with average growth have a better rooting than cultivars with strong growth.
- Rooting yield is higher when, mother plants from where the pieces are taken from and prepared pieces are in a more advanced stage of vegetation.

5. References

1. **Bacu A., Thomaj F, Kalaitzis P. 2011** A comparative study of the genetic variability of local olive cultivars of Albania based on SSSRs, SNPs AFLPs and RAPDs. (Rev. Kërkimi shkencor në bujqësi dhe prodhimin shtazor për zhvillimin rural V1; Nr1 2011.57- 65)ISSN 2224-7718
2. **Caruso T. Campisi G. Et al. 2011** Manuale per la produzione, gestione e difesa in vivaio dell'olivo. (Olviva)
3. **Claudio Di V., Sabrina N., Carmen S.(2008)** Variabilità dell'attitudine rizogena ed effetto di trattamenti di stimolo alla radicazione di talee di cultivar di olivo.
4. **Detori S. 1981.** Radicazione delle cultivar sarde d'olivo. Nota 1: nebulizzazione ed influenza clonale. (Studi Sassari III Agr. 174-182)
5. **Di Vaio C., Nocerino S. e Sorrentino C.2009** Variabilità dell'attitudine rizogena ed effetto di trattamenti di stimolo alla radicazione di talee di cultivar campane di olivo Campane.
6. **Hartmann H.T.,Loreti F. 1964-** Ricerche sull'epoca più opportuna per la propagazione dell'Olivo mediante la tecnica della nebulizzazione. (Atti giornate di Studio sulla Propagazione delle Specie legnose) I, Pisa.
7. **Jacoboni N. 1958** - Una nuova tecnica nella propagazione dell'Olivo per talea.(Olivicoltura n, 5.)
8. **Loreti F., Hartmann H.T. 1964** - Ricerche su alcuni fattori che influenzano la radicazione delle talee di Olivo con la tecnica della nebulizzazione. (Giornate di Studio sulla Propagazione delle Specie legnose), Pisa.
9. **Thomaj F, Panajoti Dh. 2003.** "Kultivaret e ullirit". Tiranë. ISBN 99927-941-8-6
10. **Tombesi A. 1967** - La variazione stagionale della radicazione di talee semilegnose di Olivo cv. "Dolce Agogia". (Ann. Fac. Agr. Perugia).